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Espinosa

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(54) **HOLDER AND CONCRETE ANCHOR ASSEMBLIES**

1/4135 (2013.01); *E04G 15/04* (2013.01);
E04G 21/185 (2013.01); *E04B 1/4157*
(2013.01)

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E04B 1/4114; *E04B 1/4157*; *E04B 9/18*;
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See application file for complete search history.

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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(21) Appl. No.: **16/263,973**

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Related U.S. Application Data

(60) Continuation of application No. 15/057,948, filed on Mar. 1, 2016, now Pat. No. 10,202,753, which is a division of application No. 13/959,799, filed on Aug. 6, 2013, now Pat. No. 9,303,399.

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(60) Provisional application No. 61/679,985, filed on Aug. 6, 2012.

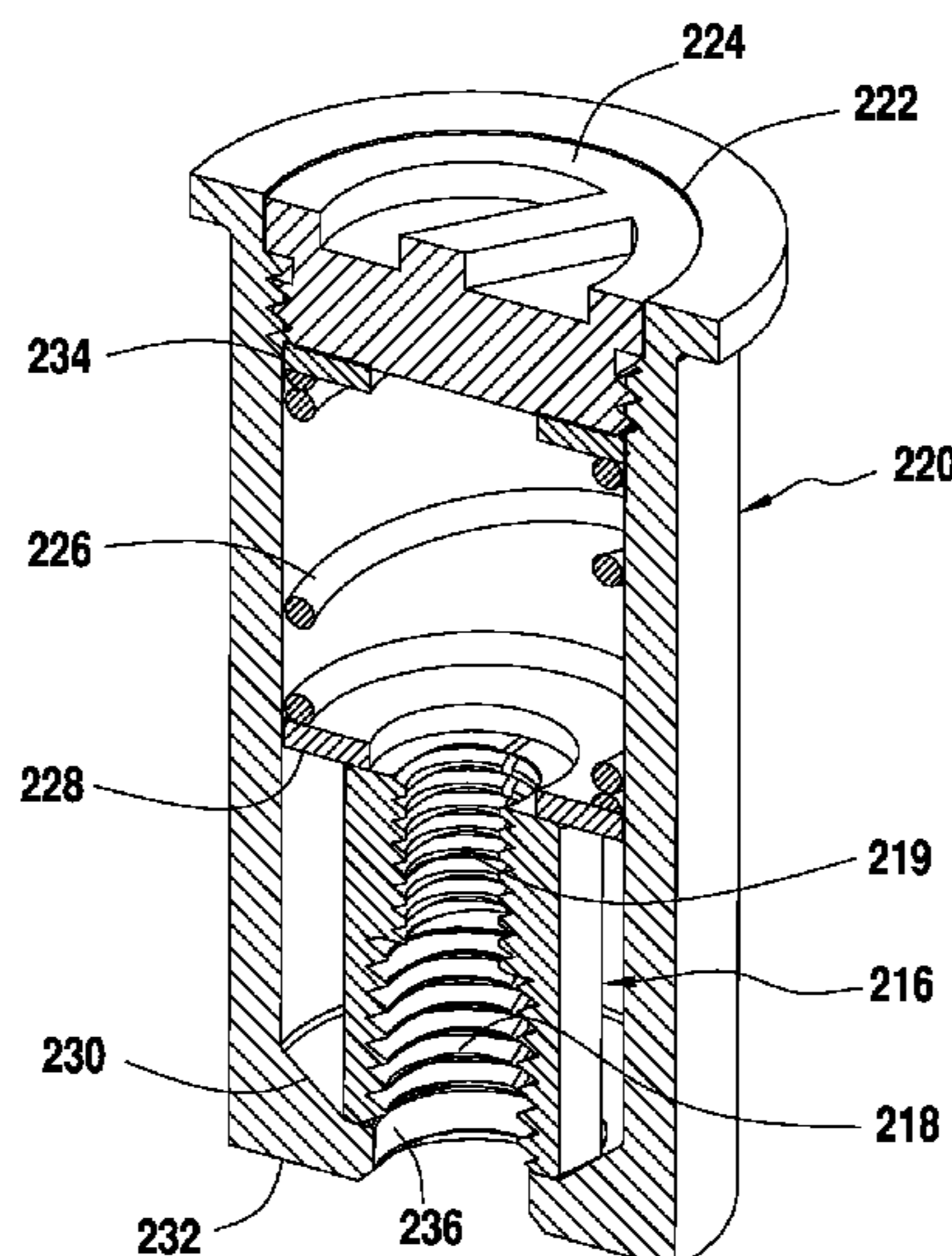
(57) **ABSTRACT**

A concrete anchor assembly includes a housing including a lower opening and a side wall; a flange portion extending from the housing; a ramp surface extending upwardly around the lower opening; a split body disposed over the lower opening, the split body including a bottom surface engaging the ramp surface, the split body including a threaded opening. The housing includes a gap between the split body and the side wall. A compressed spring forces the split body toward a bottom of the ramp surface.

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(52) **U.S. Cl.**
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20 Claims, 11 Drawing Sheets



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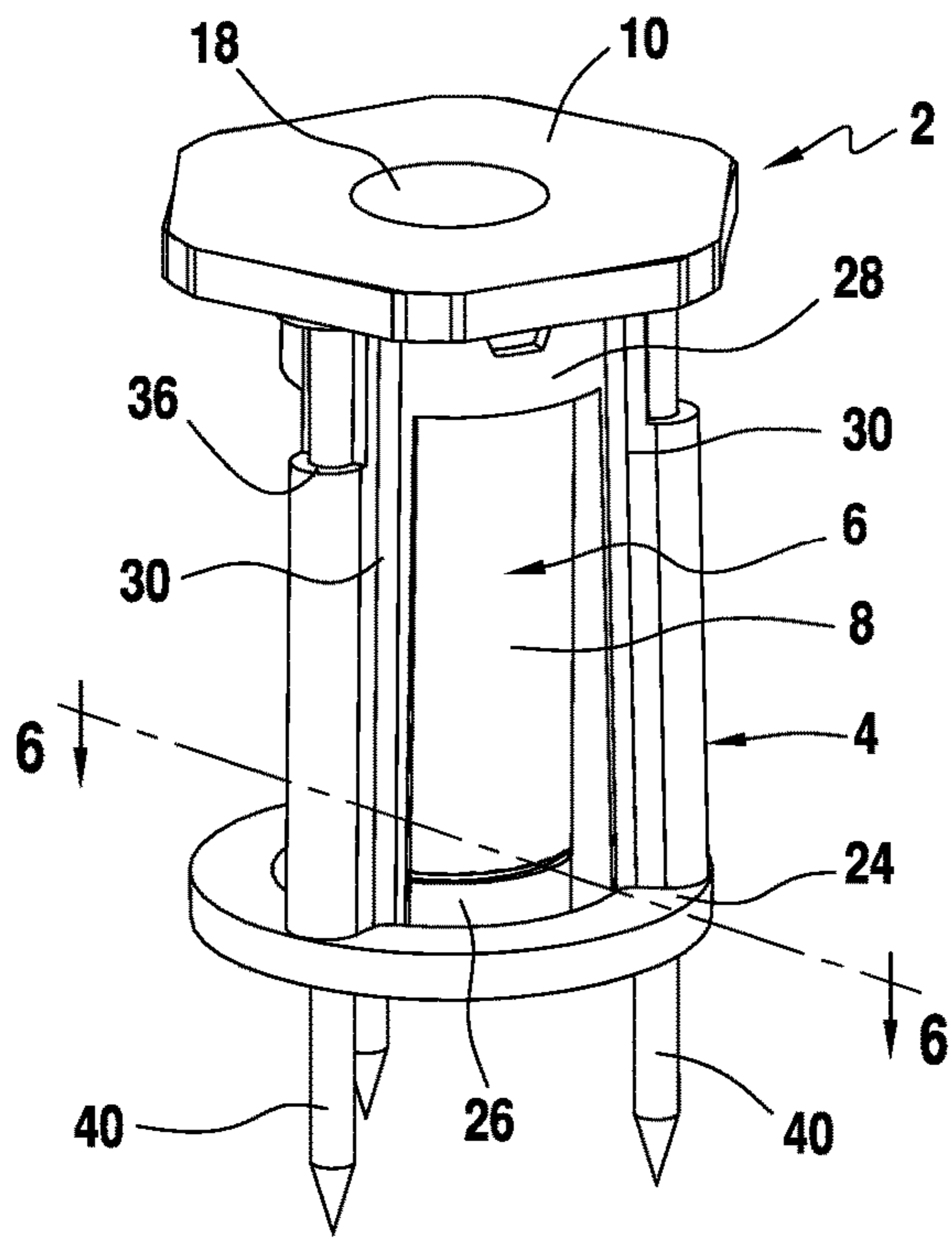


FIG. 1

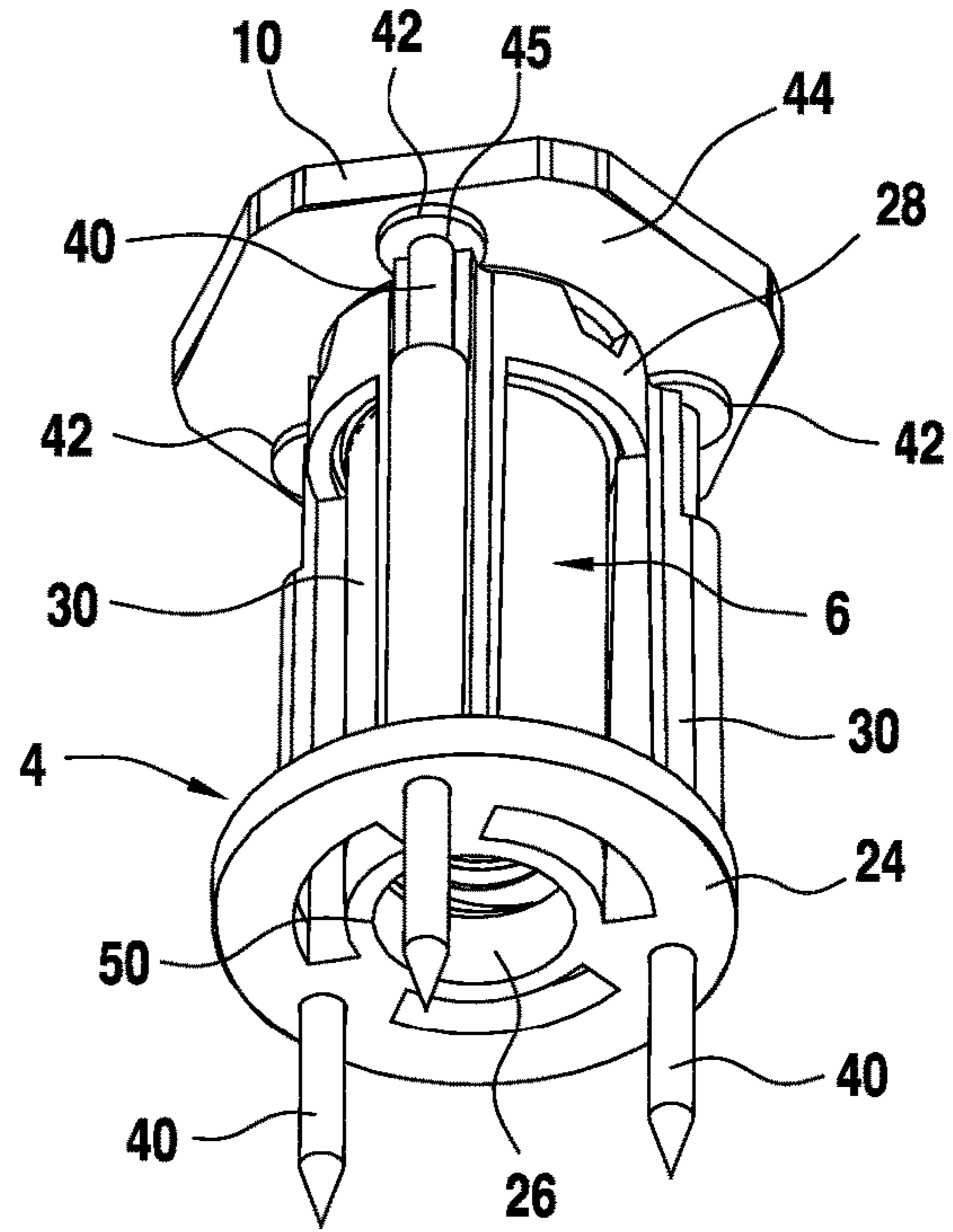


FIG. 2

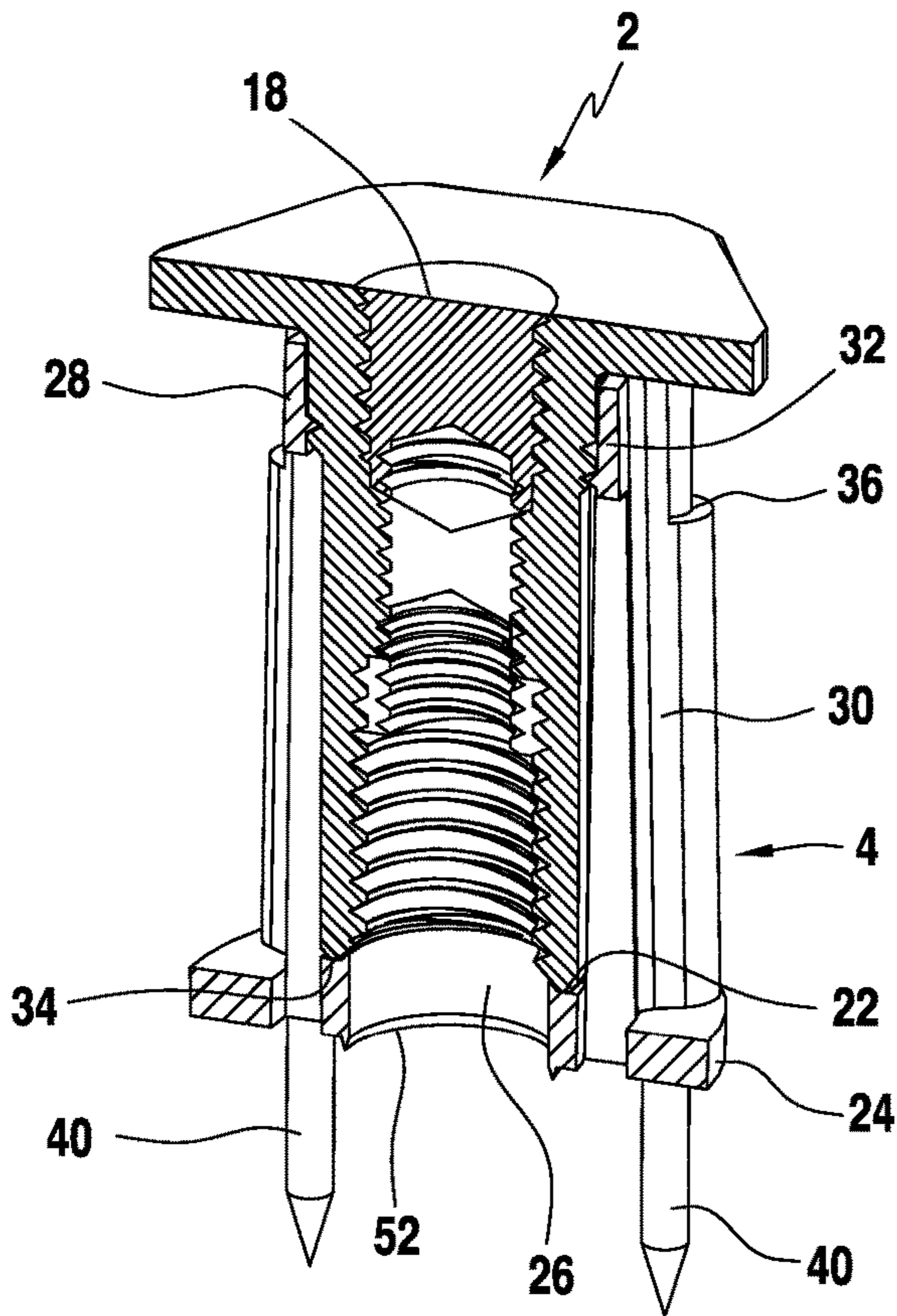


FIG. 3

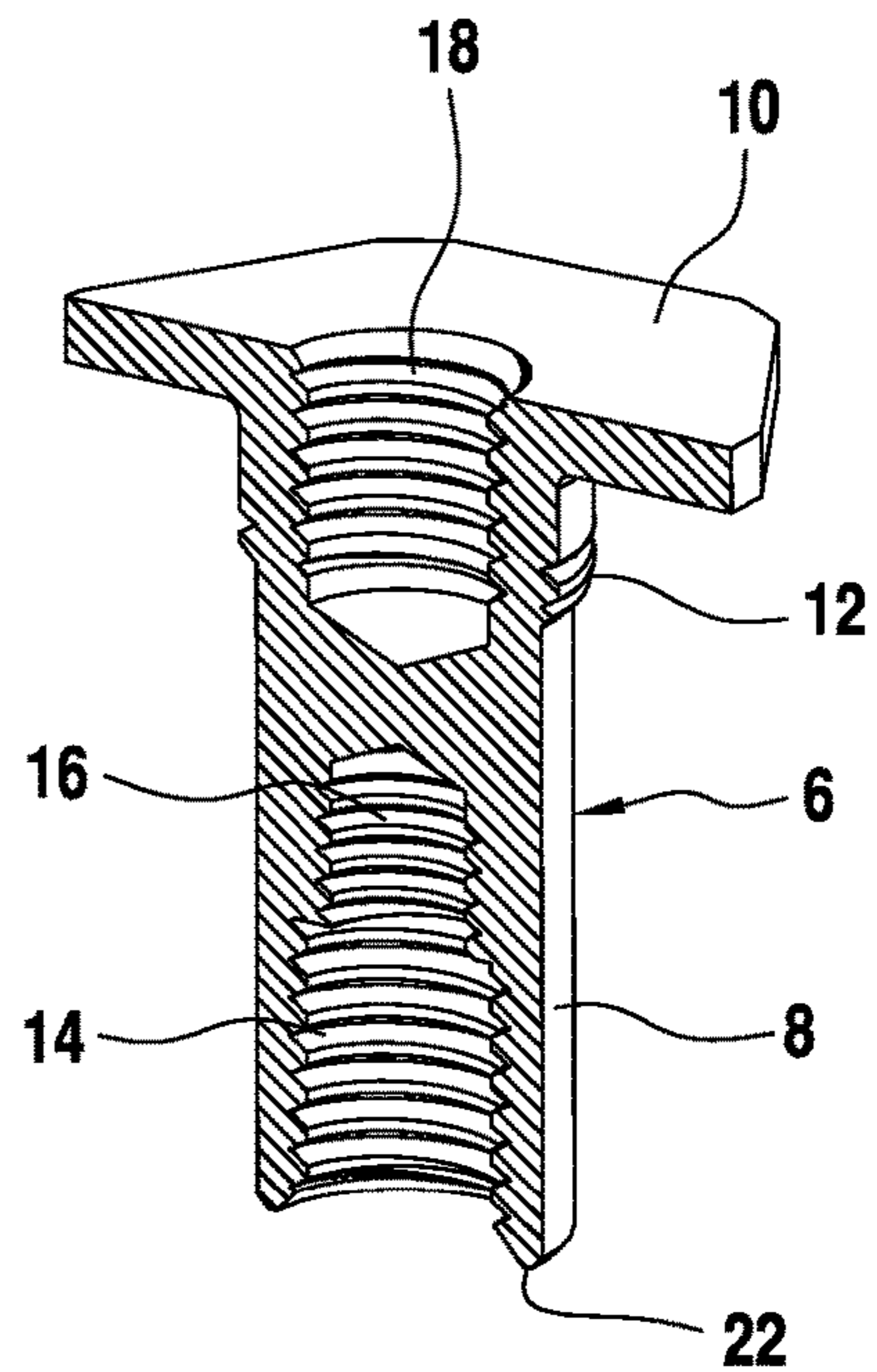


FIG. 4

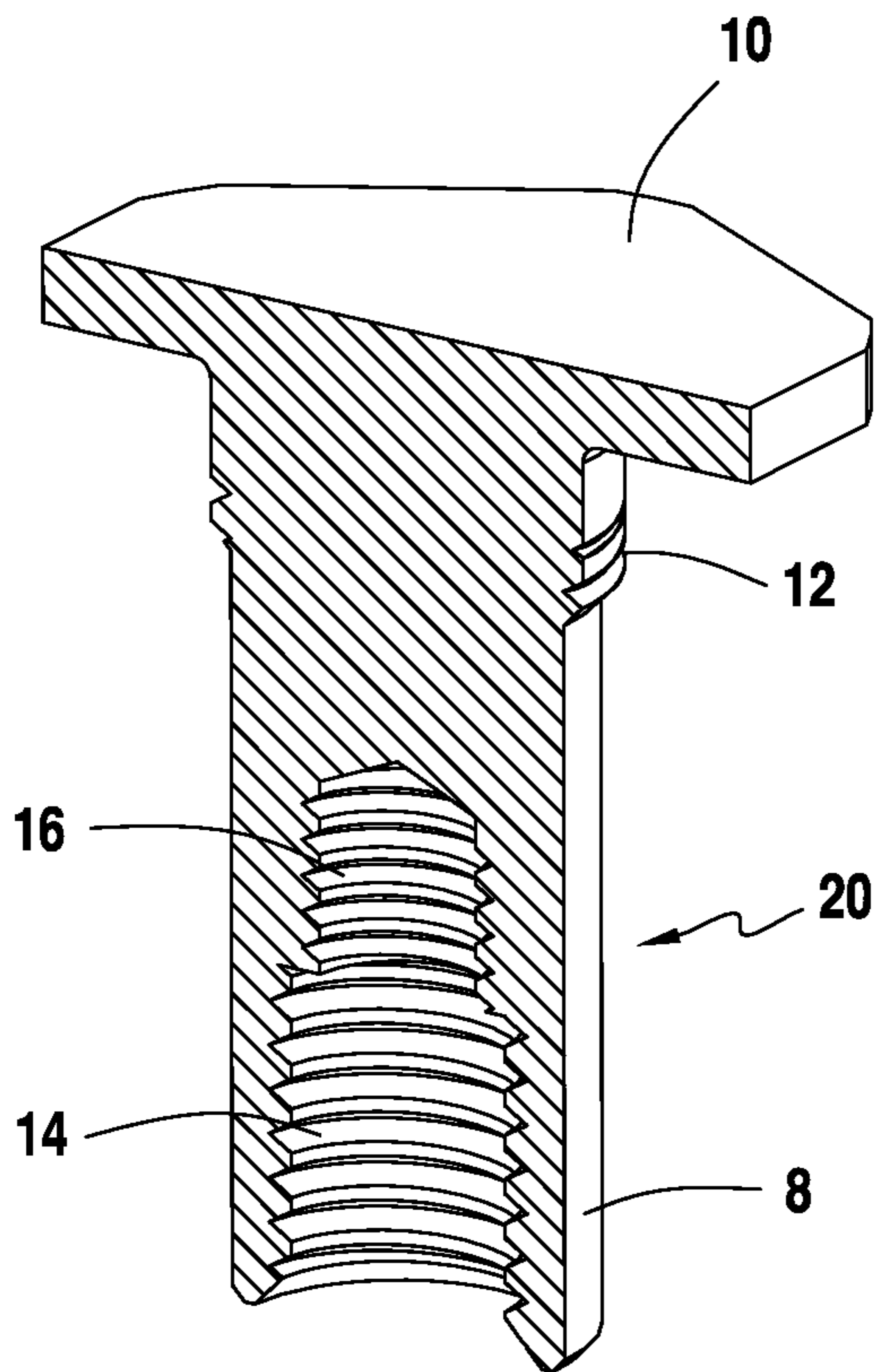


FIG. 5

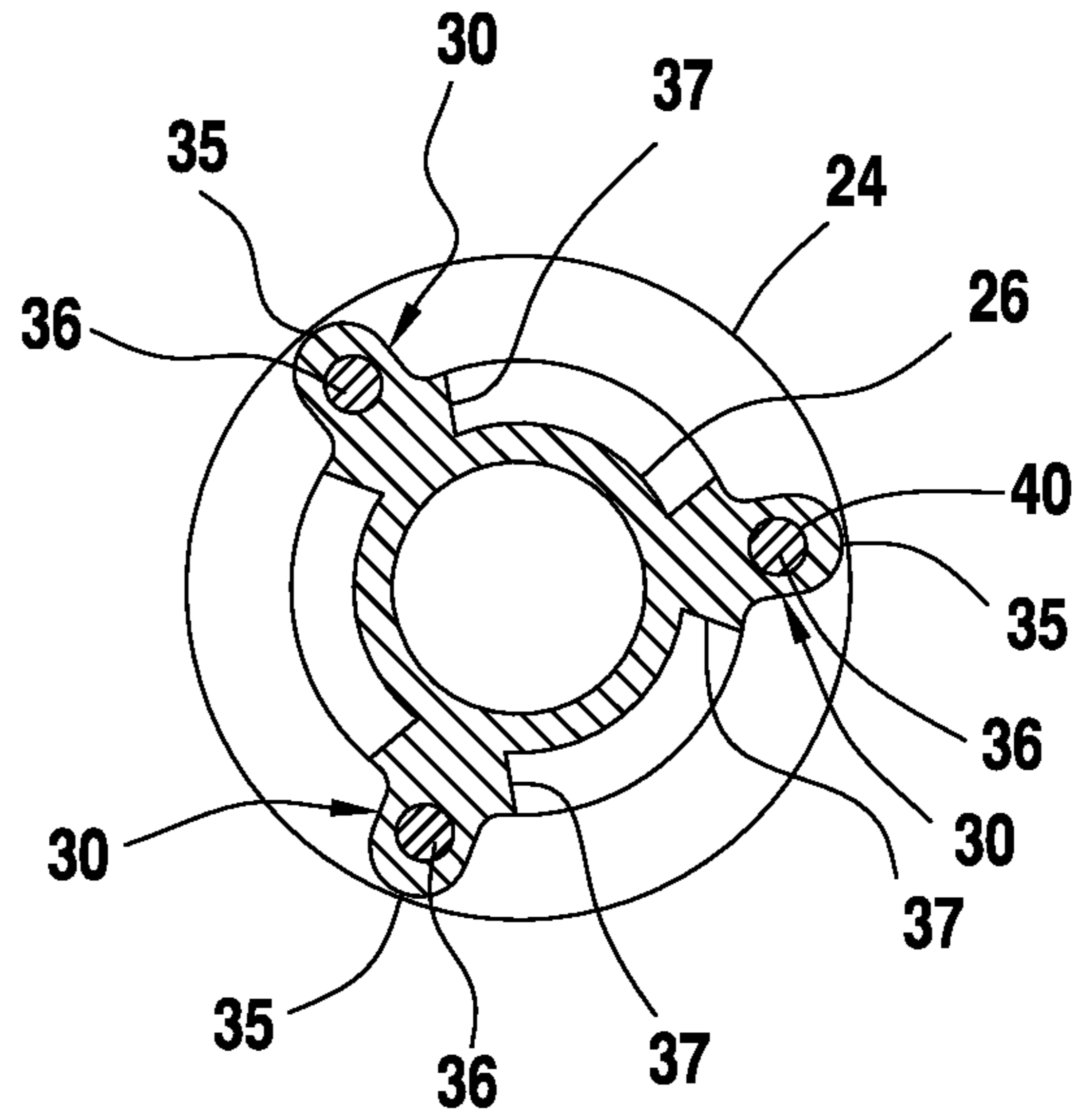


FIG. 6

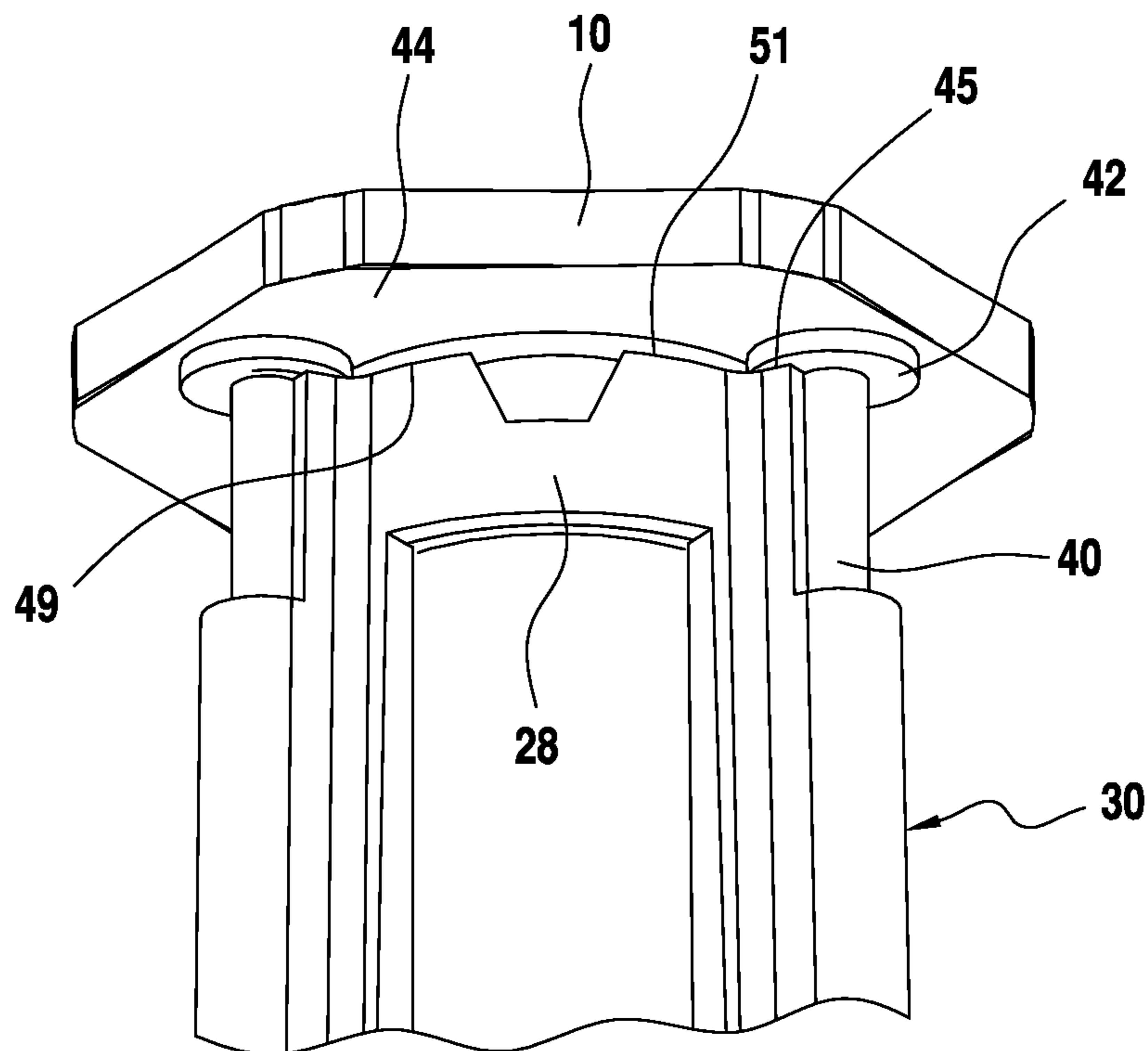


FIG. 7

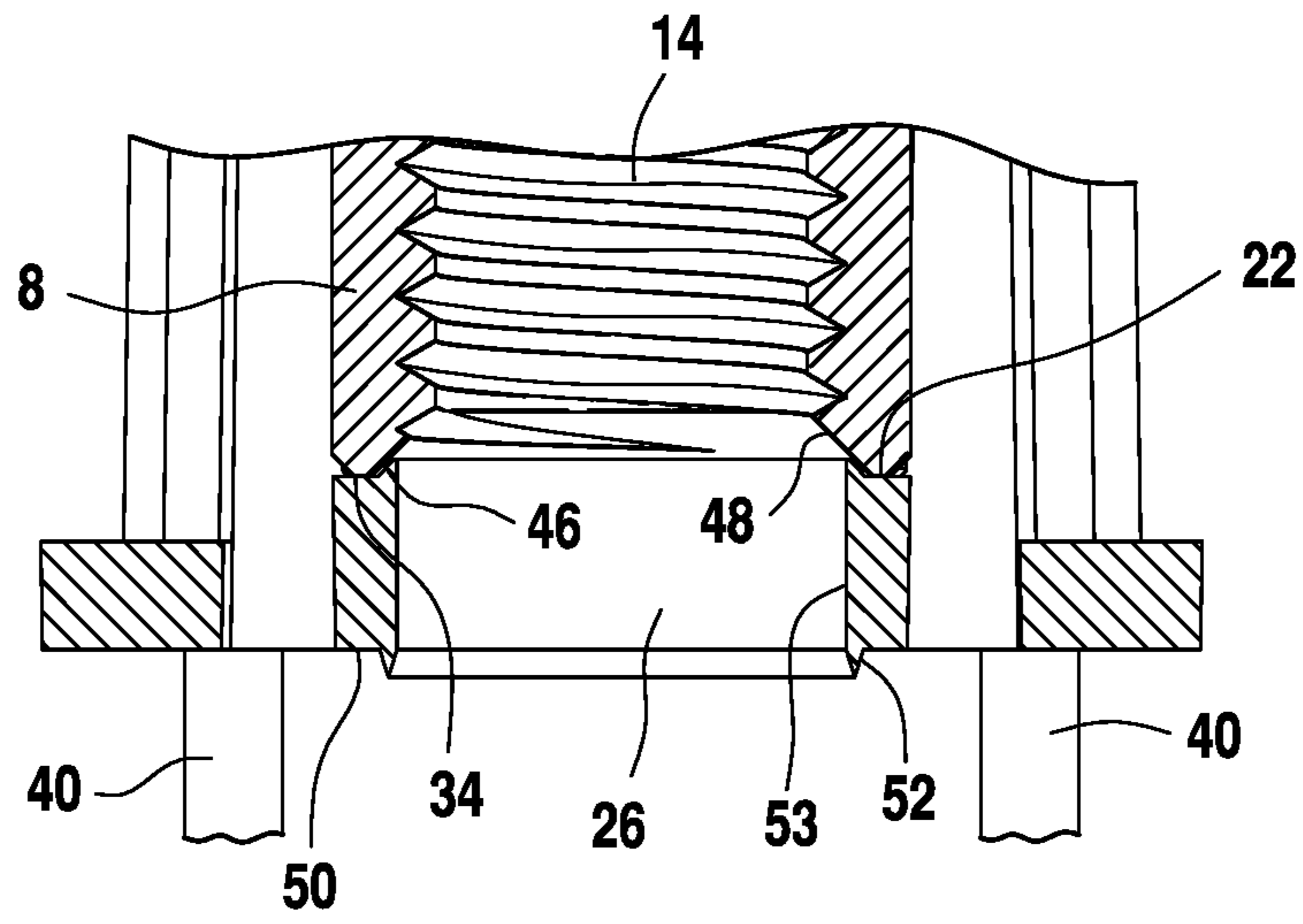


FIG. 8

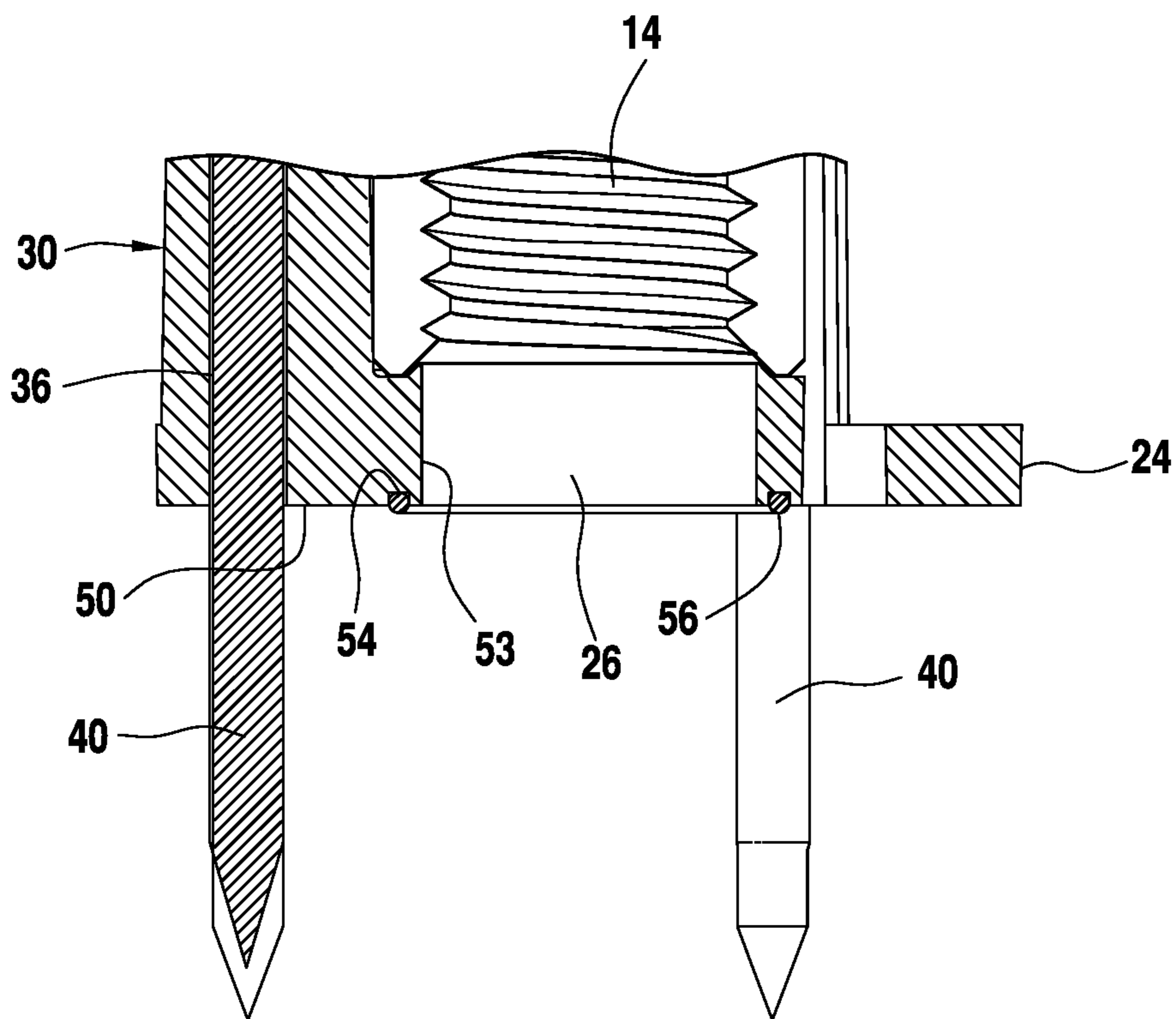


FIG. 9

FIG. 10

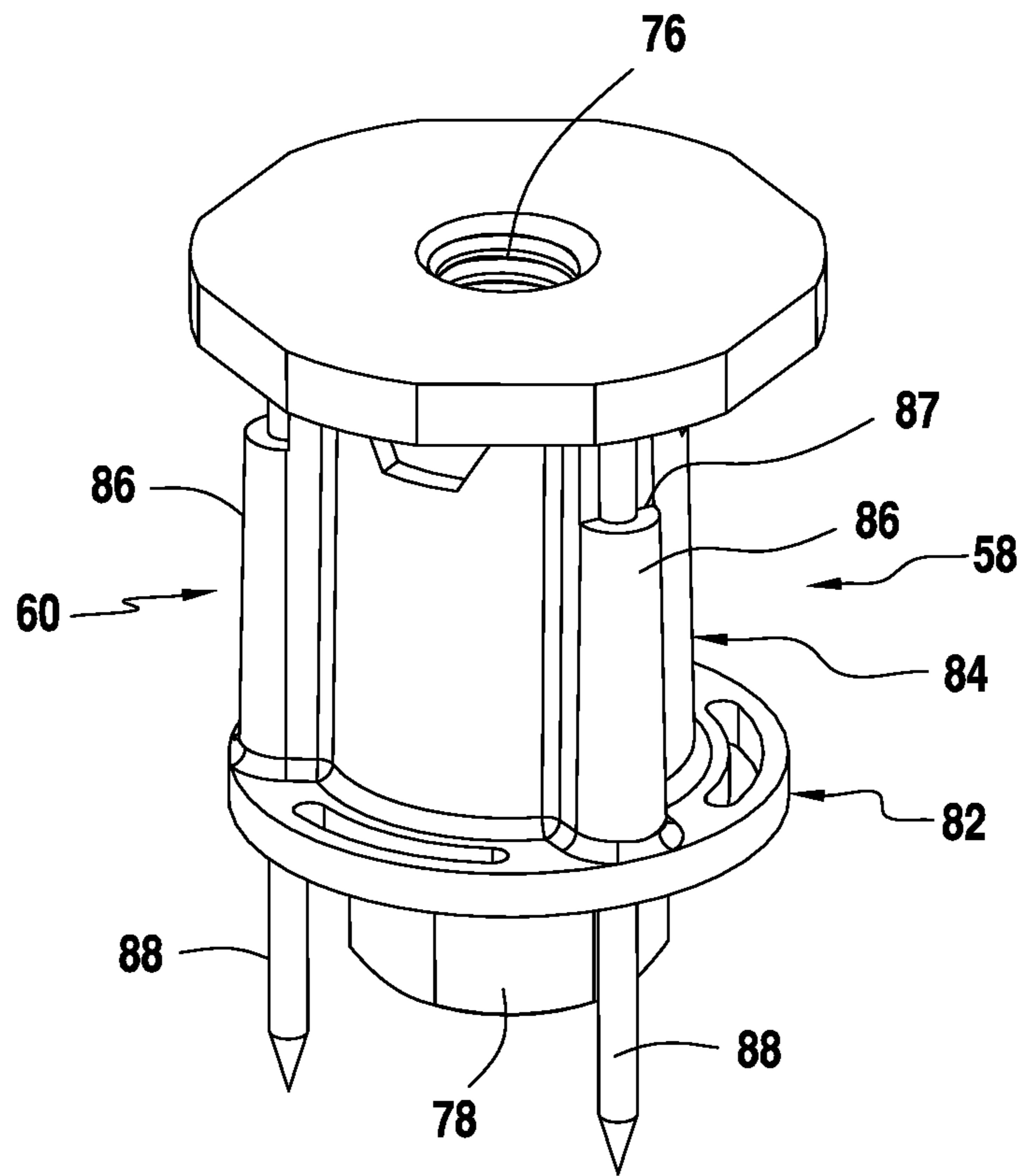
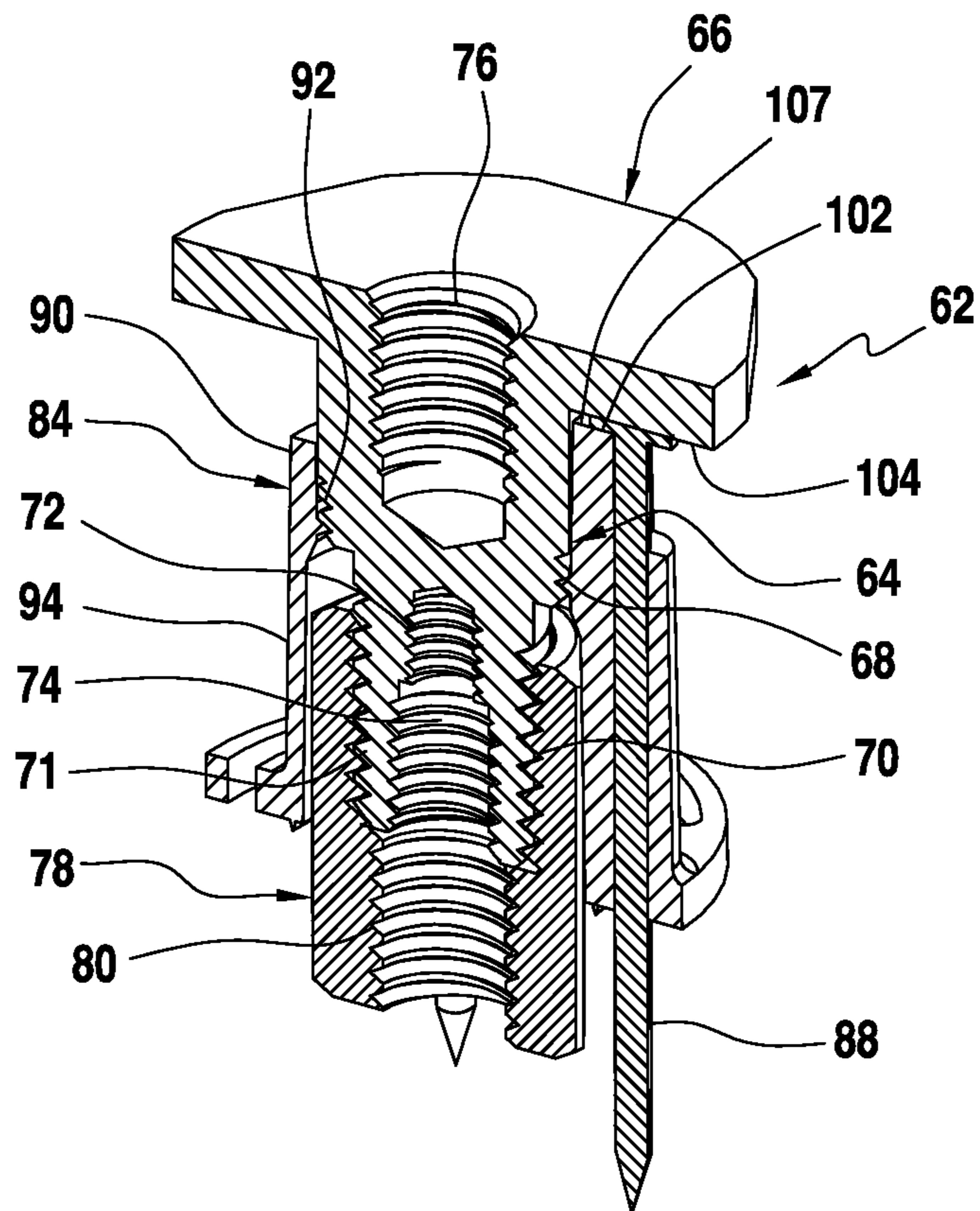


FIG. 11



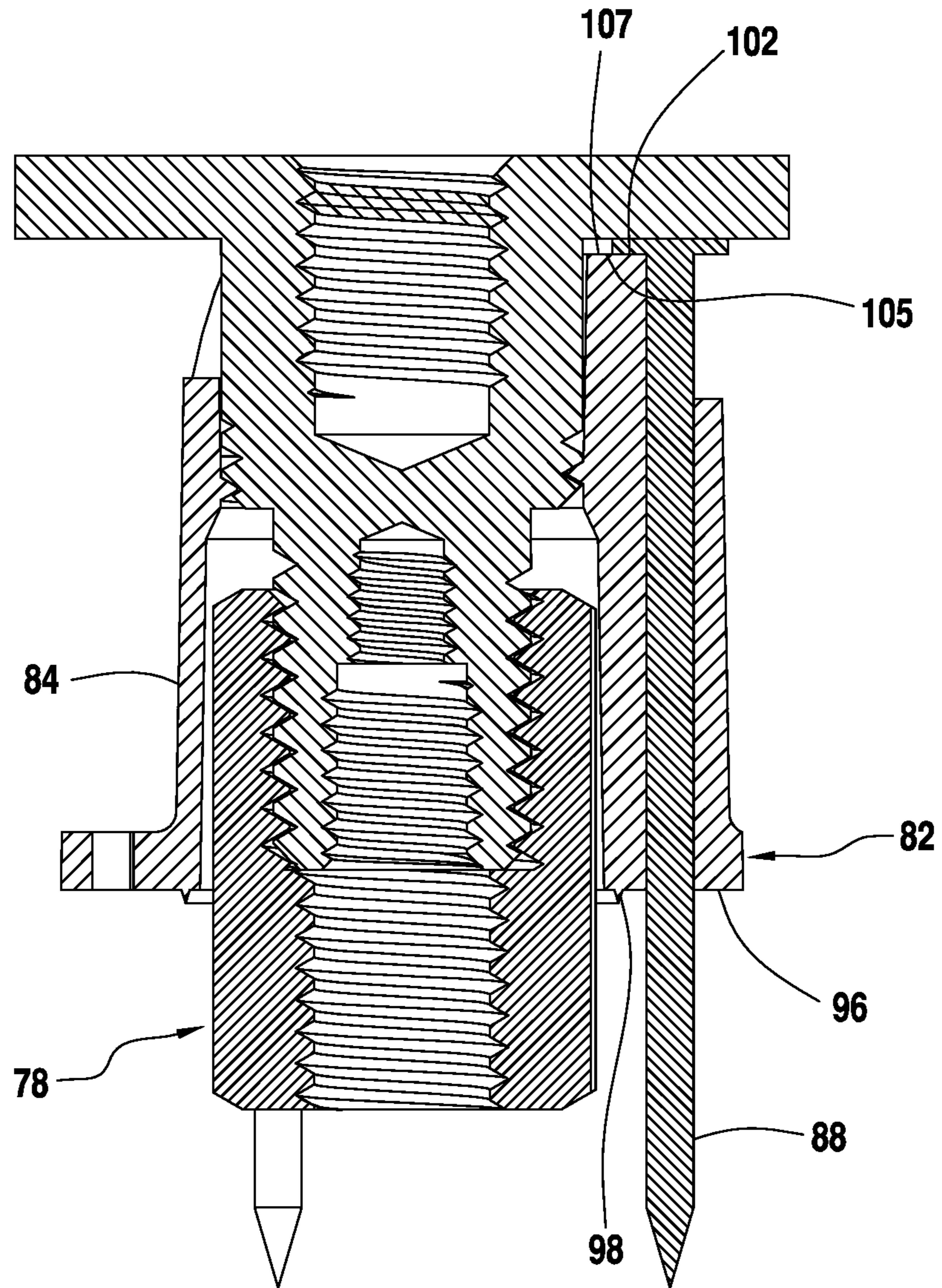


FIG. 12

FIG. 13

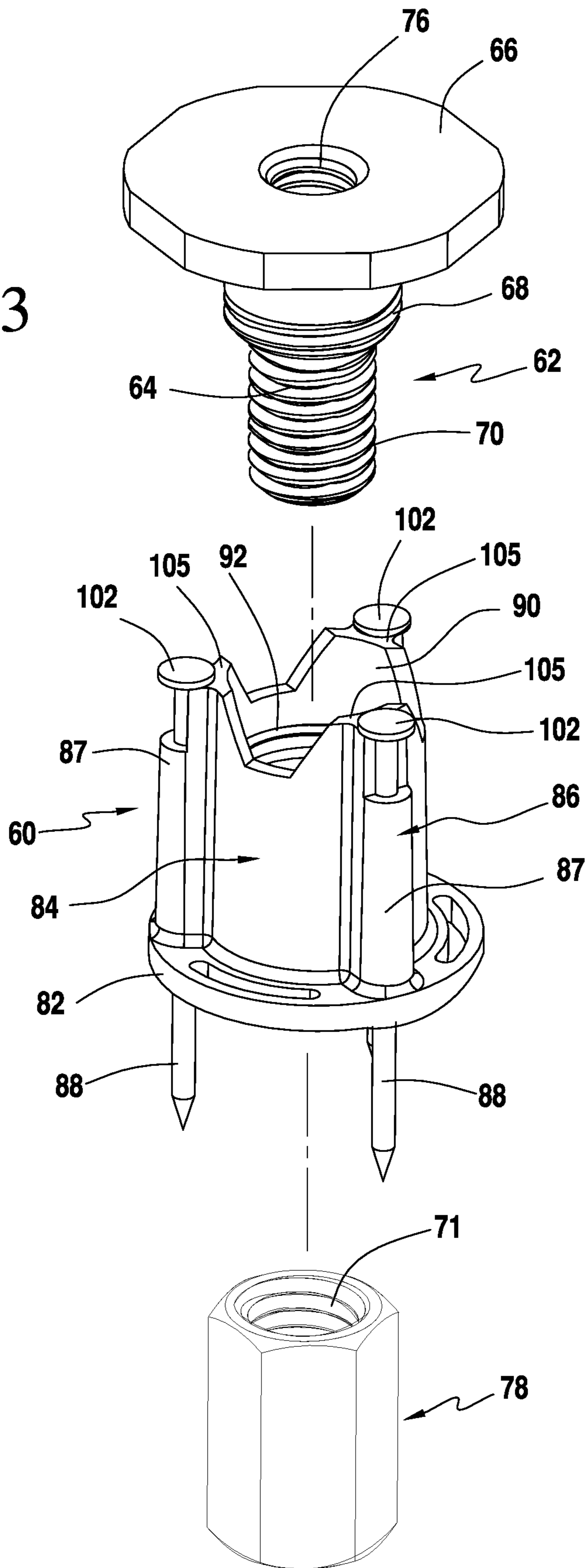


FIG. 14

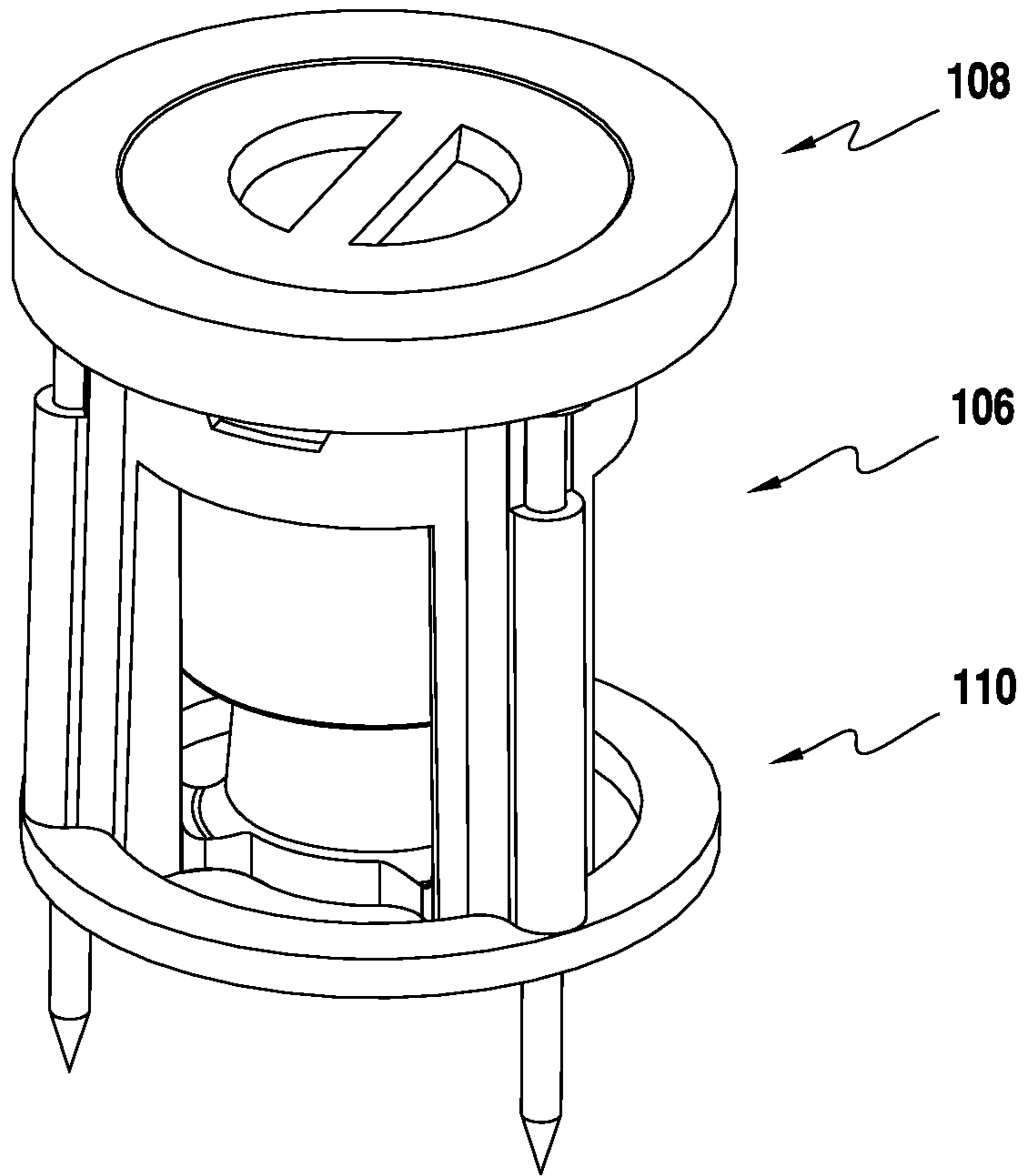
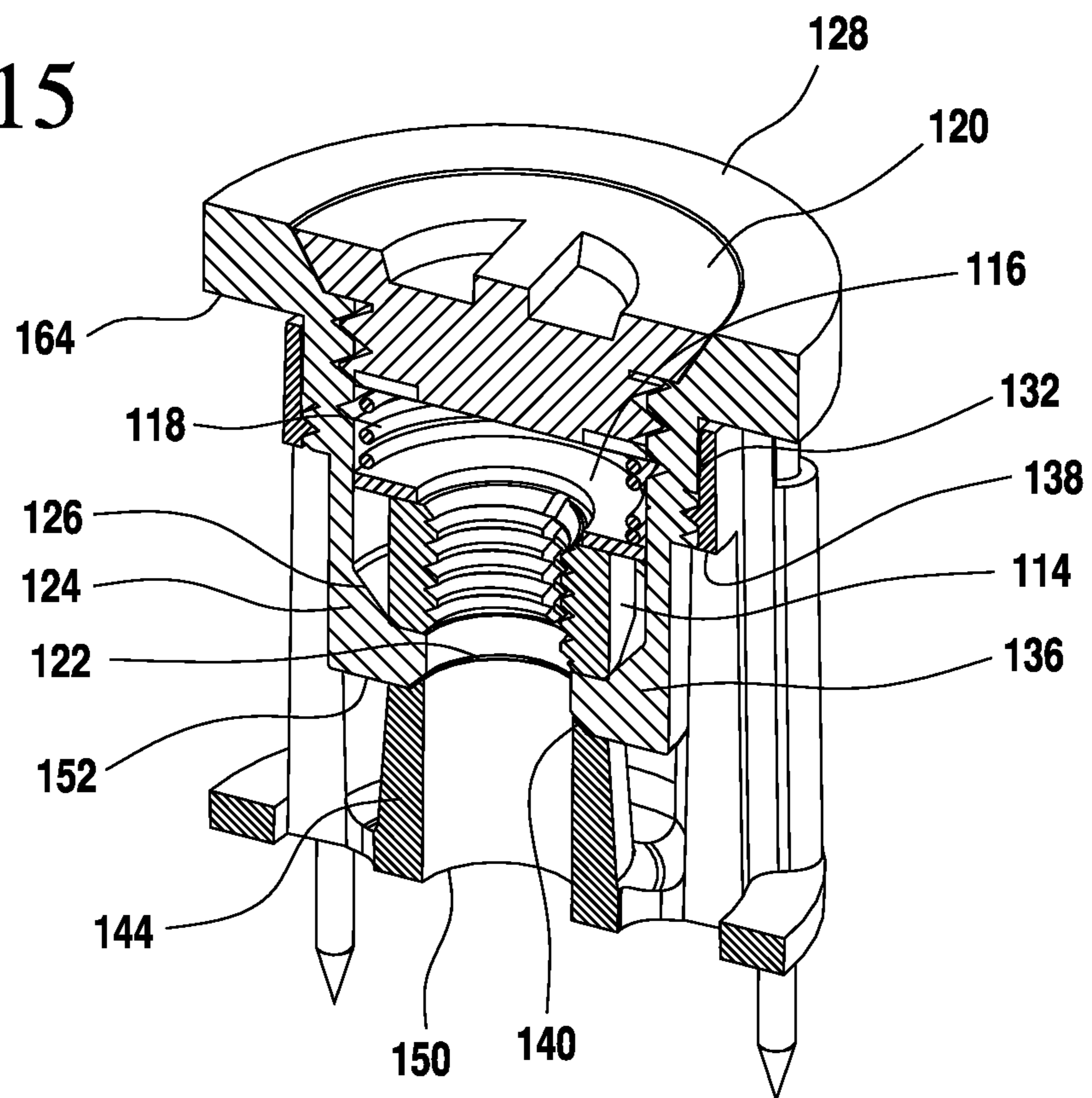


FIG. 15



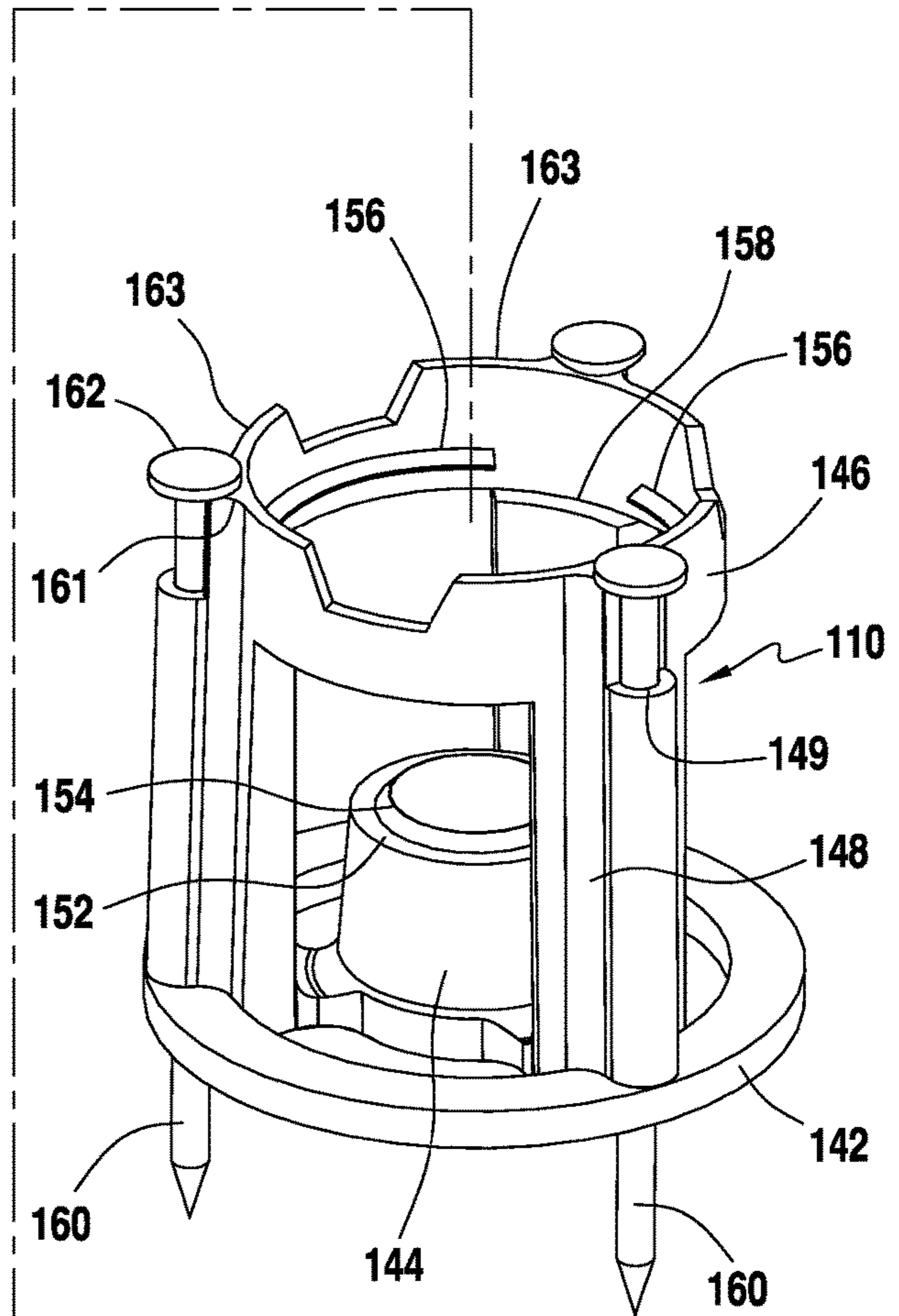
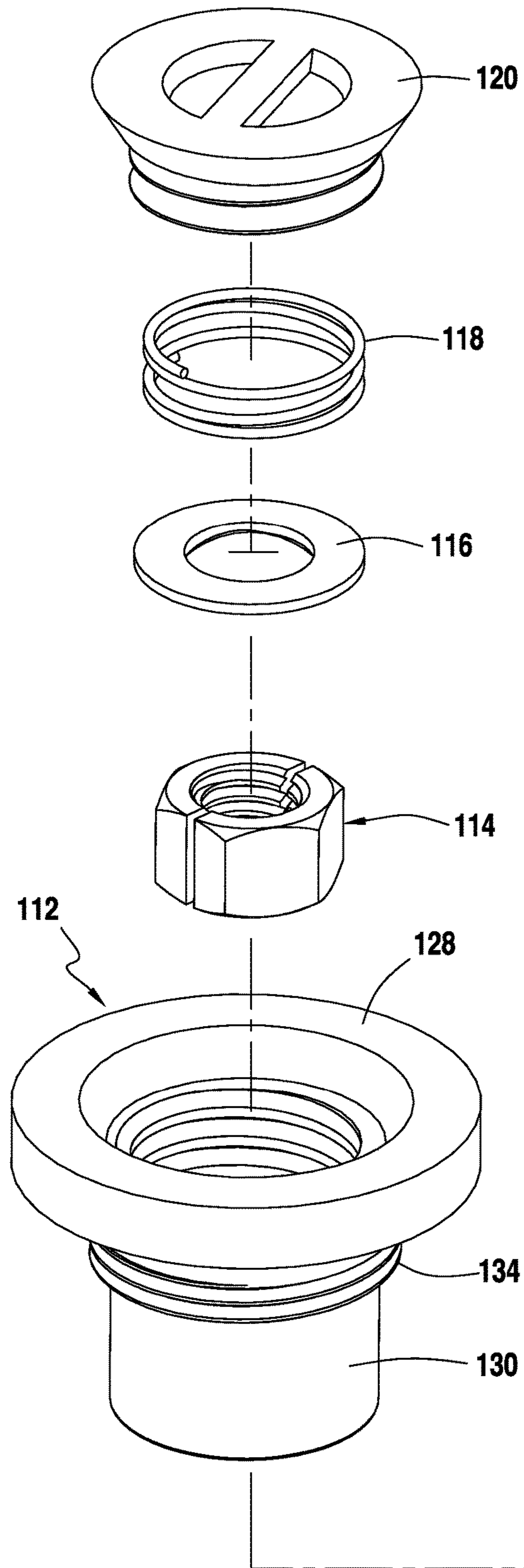


FIG. 16

FIG. 17

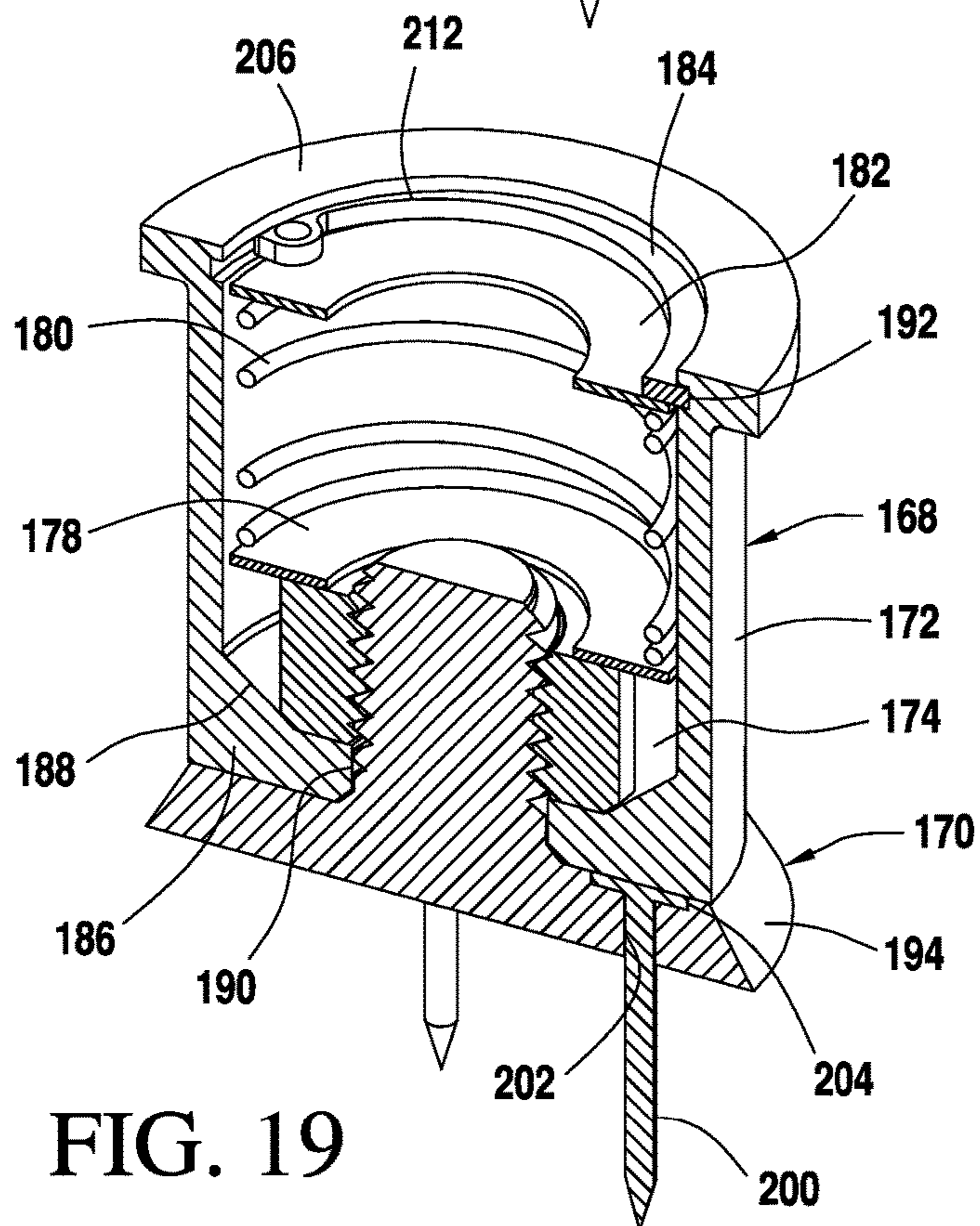
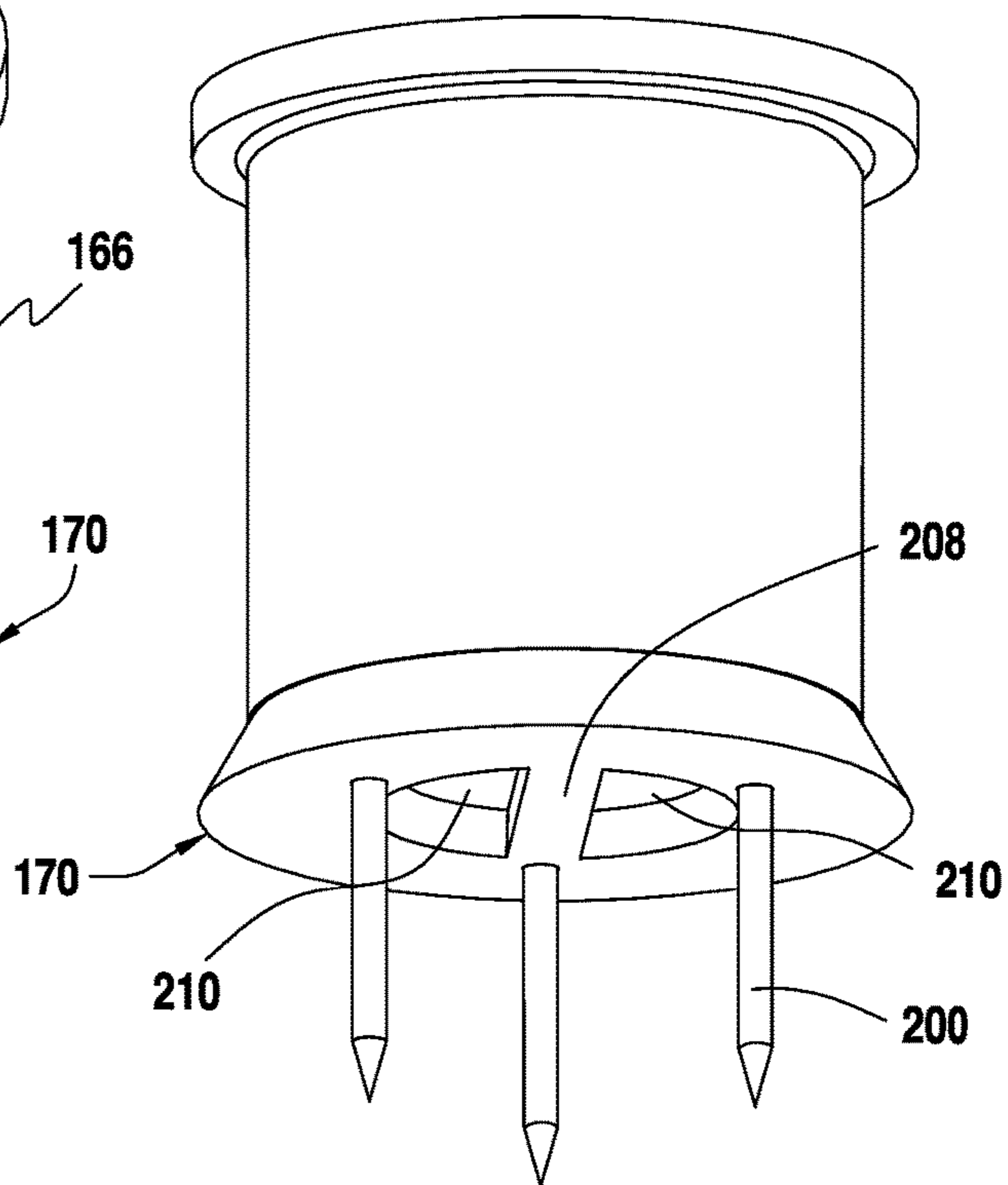
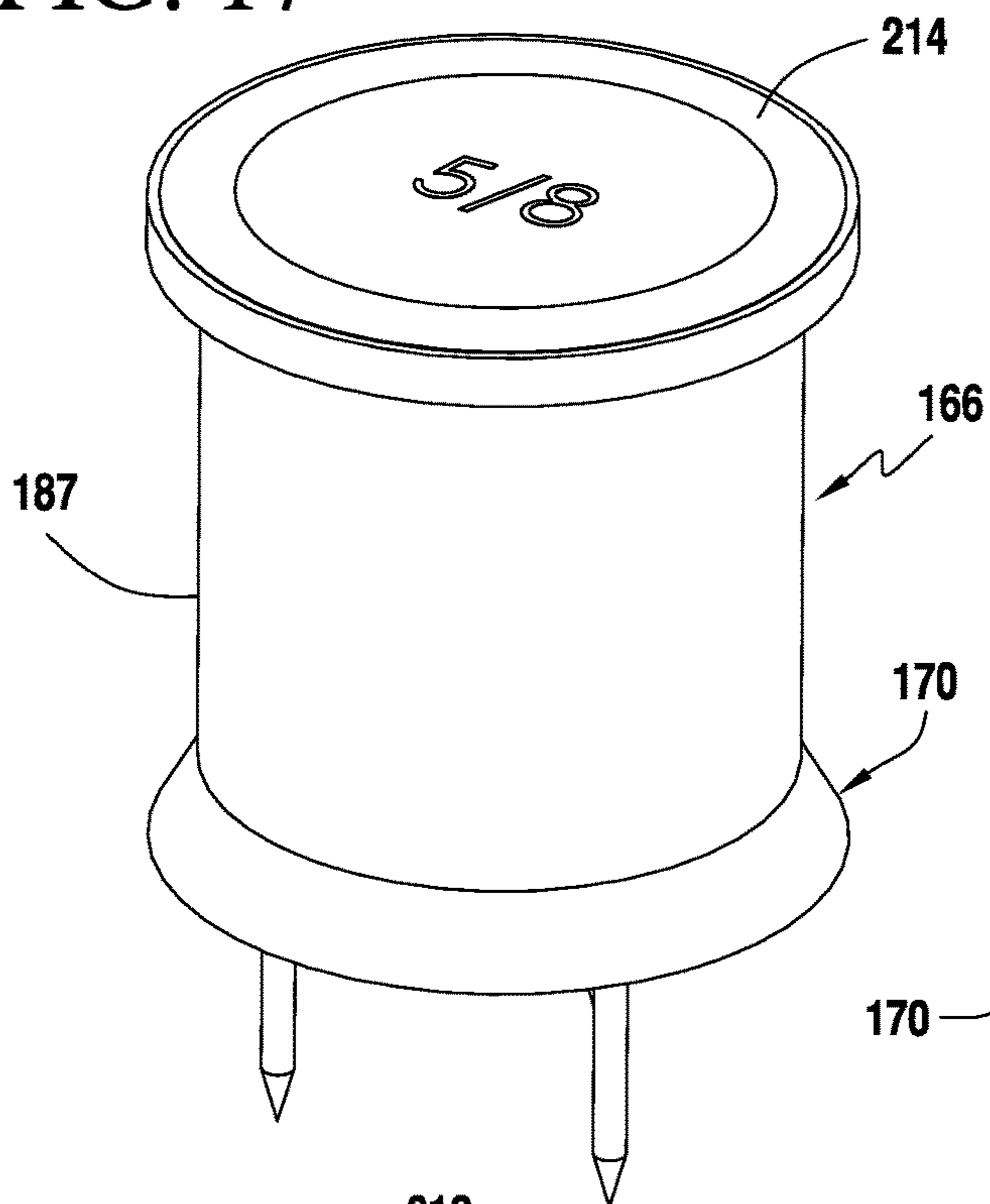


FIG. 19

FIG. 18

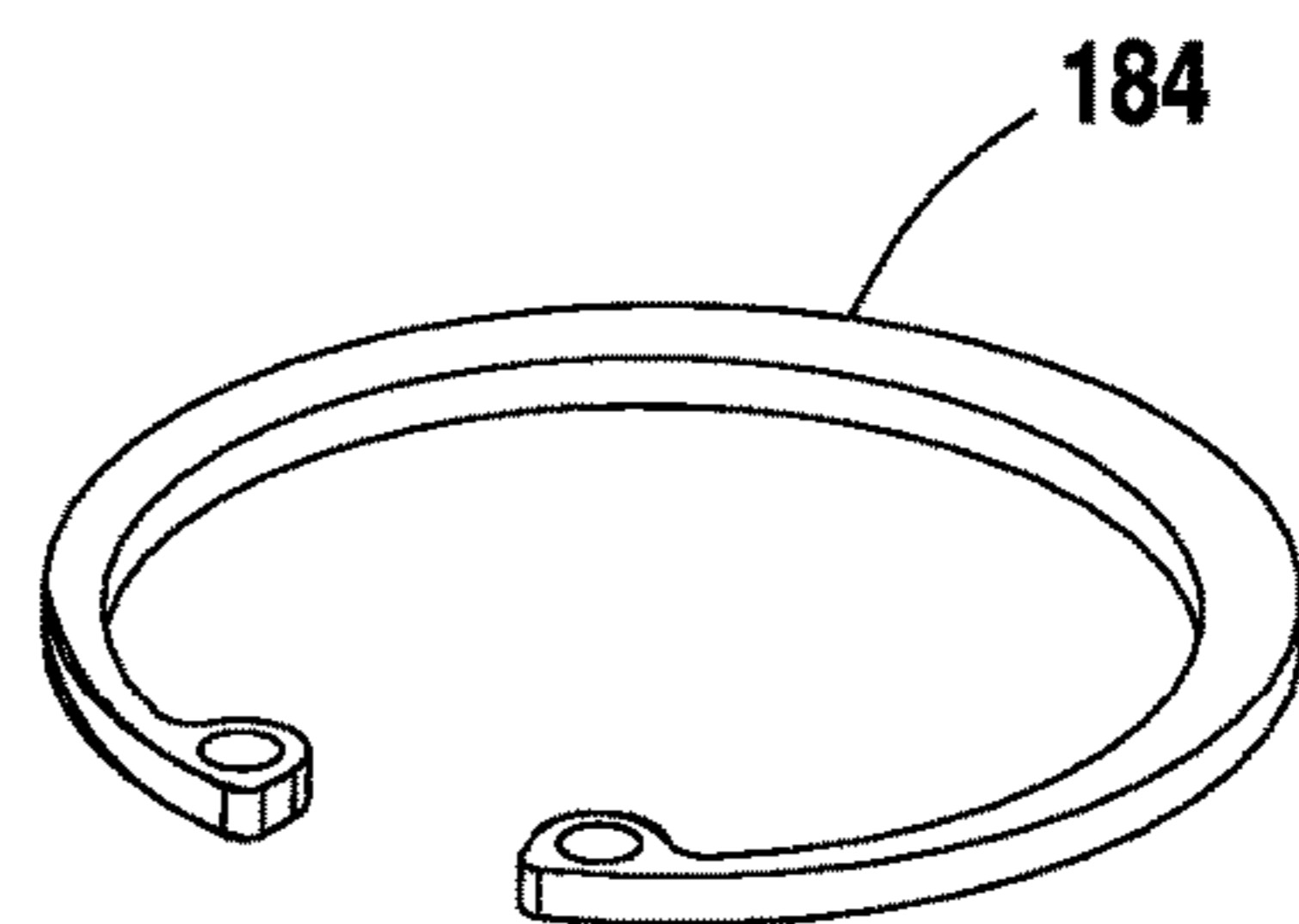


FIG. 20

FIG. 21

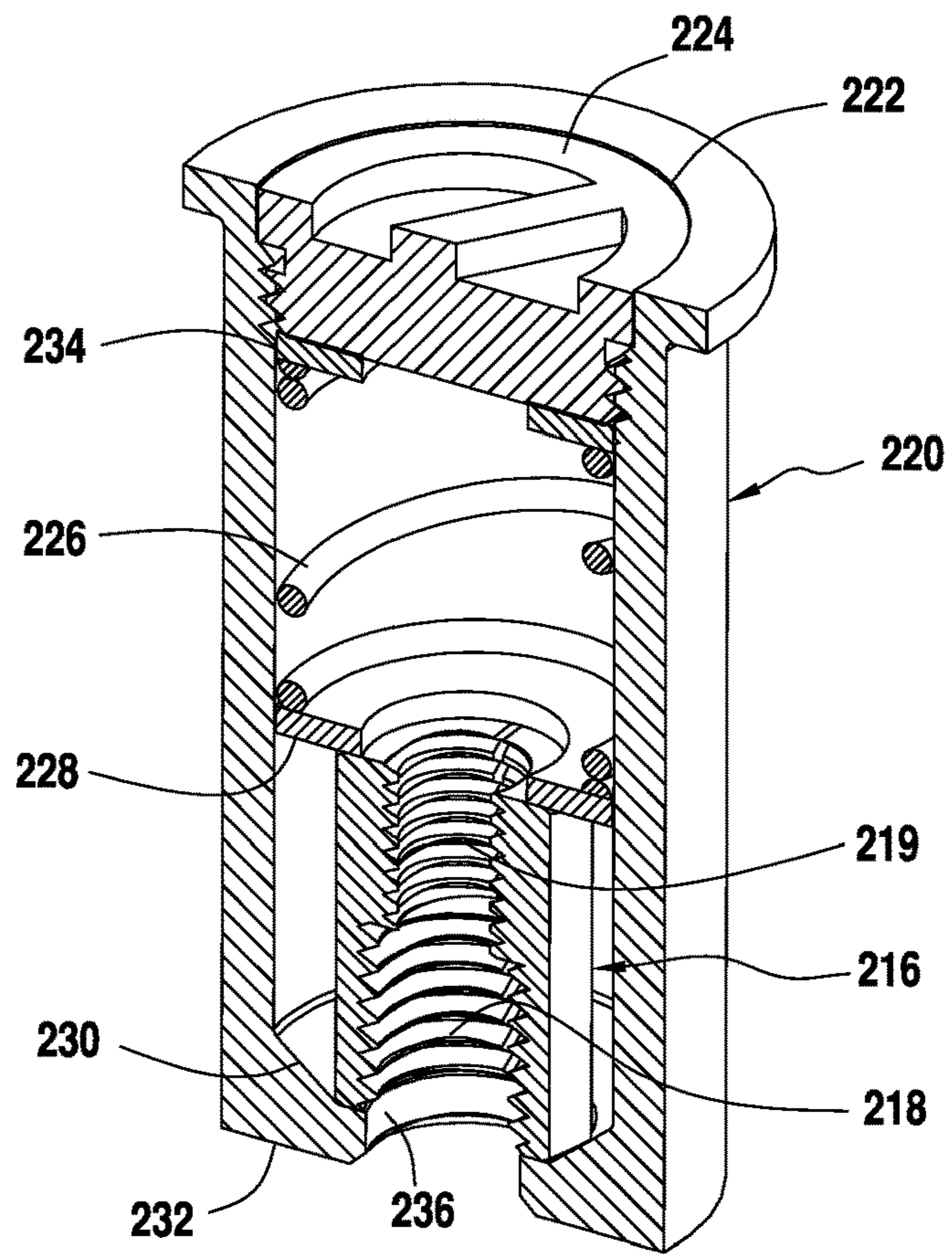


FIG. 22

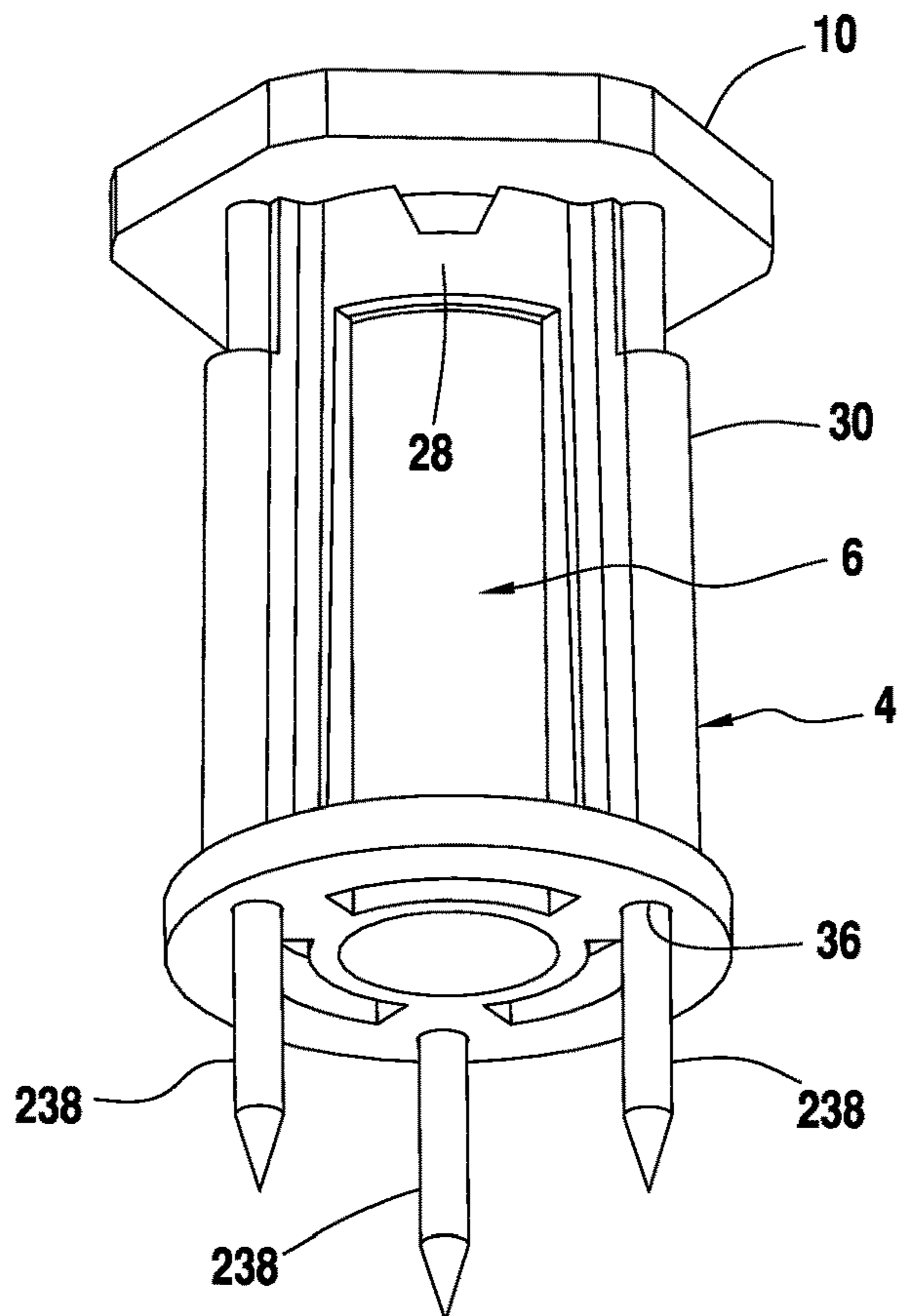


FIG. 23

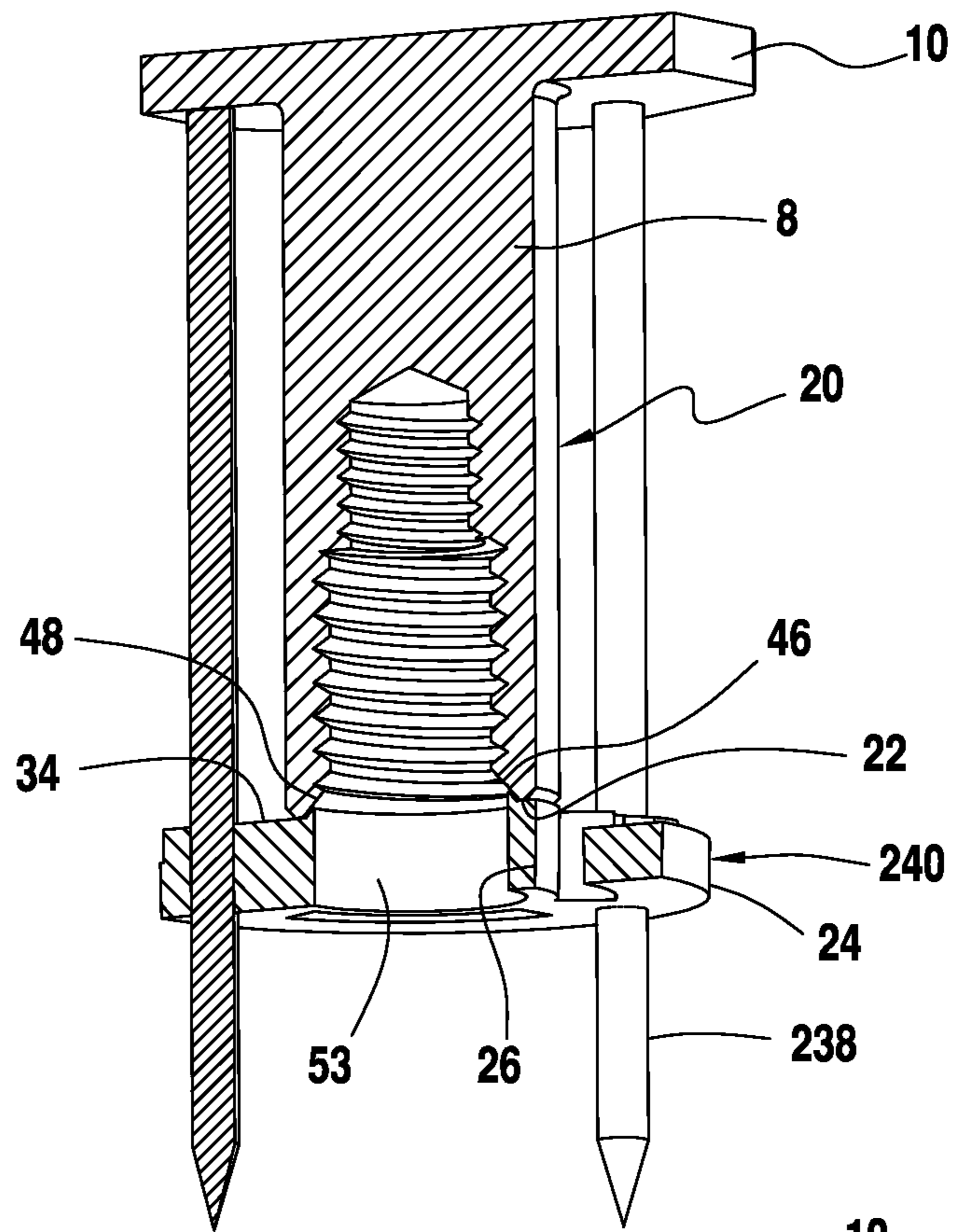
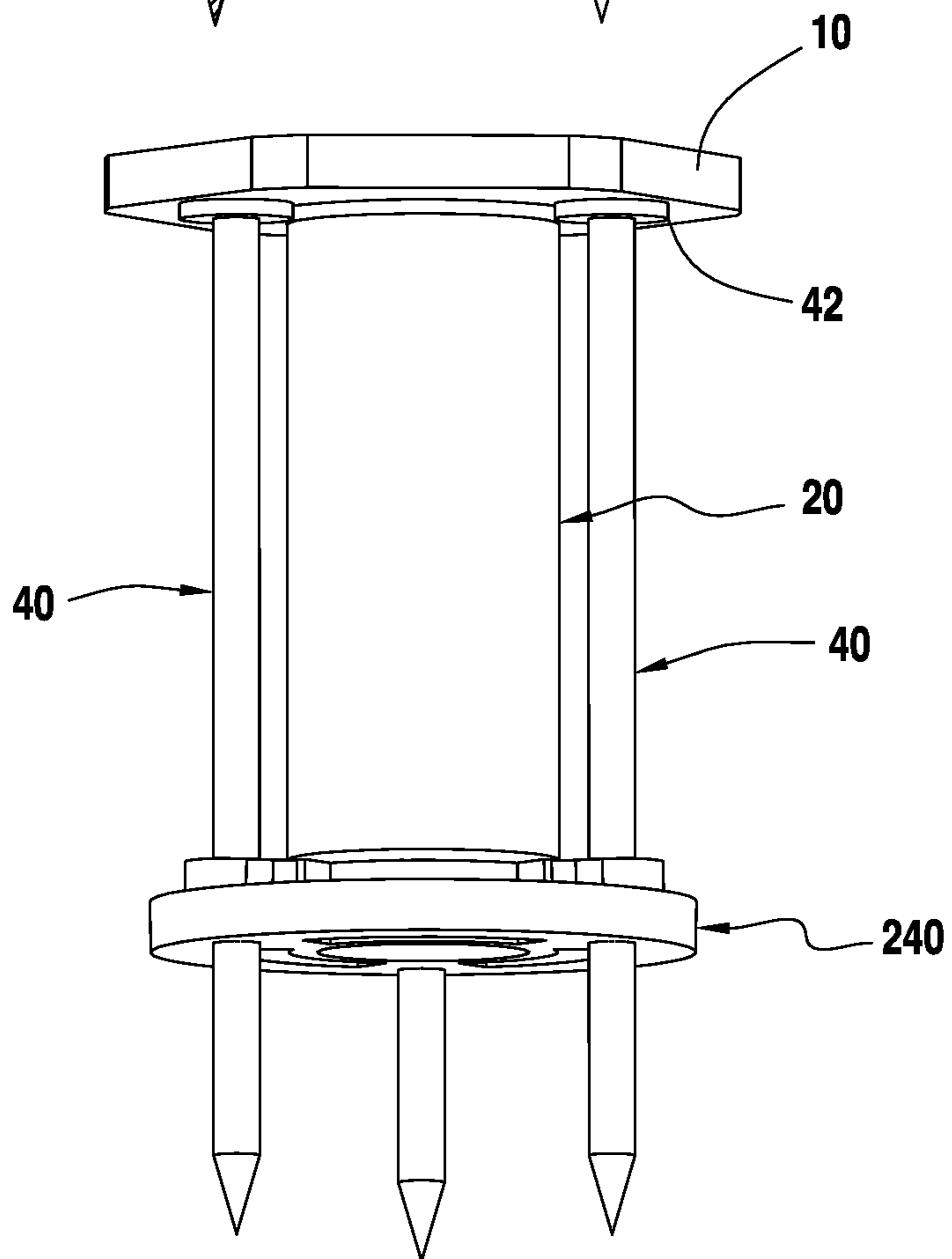


FIG. 24



1**HOLDER AND CONCRETE ANCHOR
ASSEMBLIES**

RELATED APPLICATIONS

This is a continuation of application Ser. No. 15/057,948, filed Mar. 1, 2016, which is a division of application Ser. No. 13/959,799, filed Aug. 6, 2013, which is a nonprovisional of Provisional Application Ser. No. 61/679,985, filed Aug. 6, 2012, all of which applications are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention is generally directed to holders for concrete anchors for positioning the anchors on a concrete form surface prior to pouring concrete and concrete anchor assemblies including holders.

SUMMARY OF THE INVENTION

The present invention provides a holder for a concrete anchor to be embedded in concrete, comprising base portion; a first sleeve portion vertically disposed above the base portion; post portions including vertical openings, the post portions including respective top edges for providing a shoulder to engage the nail heads when the nails are installed in the vertical openings.

The present invention also provides a concrete anchor assembly for being embedded in concrete, the assembly comprising a holder; and an anchor body held by the holder, the anchor body including a rod portion and a head portion. The holder includes a sleeve portion and a base portion, the sleeve portion being vertically disposed above the base portion. The holder includes vertical openings and top edge. Nails are disposed in the respective vertical openings, the nails extending through the base portion. The nails include respective nail heads extending over and engaging the top edge. The head portion of the anchor body extends laterally from the rod portion, the head portion including an underside in direct contact with the nail heads.

The present further provides a concrete anchor assembly, comprising a housing having a top opening, the housing including a bottom wall with a bottom opening; the bottom wall including a ramp surface extending upwardly and away from the bottom opening; and a split nut disposed on the bottom wall and over the bottom opening. A spring is biased to force the split nut toward a bottom of the ramp surface.

The present invention also provides a concrete anchor assembly, comprising a housing including a lower opening and a side wall; a flange portion extending from the housing; a ramp surface extending upwardly around the lower opening; a split body disposed over the lower opening, the split body including a bottom surface engaging the ramp surface, the split body including a threaded opening; the housing including a gap between the split body and the side wall; and a spring to force the split body toward a bottom of the ramp surface.

The present invention also provides a concrete anchor assembly, comprising an anchor body including a rod portion and a head portion; the head portion extending laterally from said rod portion, the head portion including a threaded bore; and the rod portion including an internally threaded bore, the rod portion including an outside thread.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top perspective view of a concrete anchor assembly embodying the present invention.

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FIG. 2 is bottom perspective view of FIG. 1.

FIG. 3 is a cross-sectional perspective view of the concrete anchor assembly shown in FIG. 1.

FIG. 4 is a cross-sectional perspective view of an anchor body used in the concrete anchor assembly shown in FIG. 1.

FIG. 5 is a cross-sectional perspective view of another embodiment of the anchor body shown in FIG. 4.

FIG. 6 is a cross-sectional view taken along line 6-6 in FIG. 1.

FIG. 7 is an enlarged fragmentary view of a portion of FIG. 2.

FIG. 8 is an enlarged cross-sectional view of the lower portion of FIG. 3, showing a sealing feature.

FIG. 9 is another embodiment of the sealing feature shown in FIG. 8.

FIG. 10 is a perspective view of another embodiment of a concrete anchor assembly embodying the present invention.

FIG. 11 is a perspective longitudinal cross-sectional view of FIG. 10.

FIG. 12 is an elevational cross-sectional view of FIG. 11.

FIG. 13 is an assembly view of FIG. 10.

FIG. 14 is a perspective view of another embodiment of a concrete anchor assembly embodying the present invention.

FIG. 15 is a perspective longitudinal cross-sectional view of FIG. 14.

FIG. 16 is an assembly view of FIG. 14.

FIG. 17 is a top perspective view of another embodiment of a concrete anchor assembly embodying the present invention.

FIG. 18 is a bottom perspective view of FIG. 17.

FIG. 19 is a perspective longitudinal cross-sectional view of FIG. 17.

FIG. 20 is a perspective view of a C-shaped spring clip used in the concrete anchor assembly of FIG. 19.

FIG. 21 is a perspective longitudinal cross-sectional view of another embodiment similar to FIG. 17.

FIG. 22 is a perspective view of another embodiment of the concrete anchor assembly shown in FIG. 1.

FIG. 23 is a perspective cross-sectional view of an embodiment of the concrete anchor assembly shown in FIG. 22.

FIG. 24 is a perspective view of another embodiment of the concrete anchor assembly shown in FIG. 23.

DETAILED DESCRIPTION OF THE
INVENTION

A concrete anchor assembly 2 embodying the present invention is disclosed in FIGS. 1-4. The concrete anchor assembly 2 is embedded in concrete during a concrete pour. After the concrete has cured, the concrete anchor assembly 2 is used to connect to a threaded rod for supporting a load. An illustration of manner of use involving other concrete anchors is disclosed in U.S. application Ser. No. 13/424,082, filed on Mar. 19, 2012, hereby incorporated by reference.

The concrete anchor assembly 2 comprises a holder 4 and an anchor body 6. The anchor body 6 includes a cylindrical rod portion 8 and a head portion 10 that extends outwardly of the cylindrical rod portion 8, as best shown in FIG. 3. Thread 12 is disposed at an upper end of the rod portion 8. The thread 12 is used to attach the anchor body 6 to the holder 4.

An internal threaded bore 14 is disposed at a bottom end of the rod portion 8. Another threaded bore 16 having a smaller diameter than the threaded bore 14 may be included

above the threaded bore 14. Still another threaded bore 18 may be provided through the head portion 10. The threaded bores 14, 16 and 18 are preferably co-axial. The threaded bore 18 may be used to attach another anchor body, such as a threaded bolt, to increase the load capacity of the anchor body 6. The threaded bore 18 may also be used to attach a threaded rod, which is to be extended outside of the concrete mass, as for example disclosed in WO 2010/090748, hereby incorporated by reference. The threaded bore 18 preferably does not communicate with the threaded bores 14 and 16 to keep them sealed from the concrete slurry in case the threaded bore is not used. The smaller diameter threaded bore 16 may be used for lighter load with a smaller diameter threaded rod while the larger diameter threaded bore 14 may be used for larger diameter threaded rod for higher loads. The threaded rods are used to support loads, such as pipes hung from the ceiling of a concrete deck, anchor a wall section, etc.

An anchor body 20 without the threaded bore 18 is shown in FIG. 5. All other features of the anchor body 20 are the same as those found in the anchor body 6 and are designated with like reference numerals.

The bottom edge 22 of the rod portion 8 is beveled to provide sealing contact against a confronting surface in the holder 4, as would be further explained below.

The anchor body 6 is embedded in concrete in such a way that the threaded bores 14 and 16 will be accessible for attachment of a threaded rod. The smaller threaded bore 14 or the larger threaded bore 16 may be used, depending on the load requiring a smaller or larger diameter threaded rod. The head portion 10 provides the anchoring function of the anchor body 6. For additional anchoring capacity, another anchor body, such as a standard bolt, may be attached to the threaded bore 18 prior to concrete pour. The threaded bore 18 may also be used to attach a threaded rod prior to concrete pour to support a load in the opposite direction from the load that may be supported by the threaded bore 14 or 16.

The holder 4 advantageously positions the anchor body 6 on a wood formboard such that after the concrete has cured and the formboard is removed, threaded bores 14 and 16 are accessible for attaching a threaded rod. See, for example, U.S. application Ser. No. 13/424,082.

Referring to FIGS. 1-3, the holder 4 includes a base portion 24, a plug portion 26, a sleeve portion 28 and a plurality of post portions 30. The post portions 30 connect the base portion 24 to the sleeve portion 28. The plug portion 26 is in the form of a sleeve with an opening coaxial with the opening of the sleeve portion 28.

Referring to FIG. 3, the sleeve portion 28 includes inside thread 32 that cooperate with the outside thread 12 of the anchor body 6 to thereby secure the anchor body 6 to the holder 4. The thread 32 may be a single turn and segmented thread. The bottom edge 22 of the rod portion 8 engages a confronting top edge 34 of the plug portion 26 to provide a seal to prevent entry of the concrete slurry into the bores 14 and 16 during concrete pour.

Referring to FIG. 6, the post portions 30 include respective vertical openings 36 for receiving respective nails 40 that are used to attach the holder 4 to the formboard. The post portions 30 further include respective tubular portions 35 with the openings 36 and base portions 37 connecting the sleeve portion 28 and the plug portion 26. The tubular portions 35 are attached to the respective base portions 37. The nails 40 extend downwardly from the base portion 24. The nail heads 42 are advantageously in direct contact with the bottom surface 44 of the head portion 10 of the anchor

body 6, shown in FIG. 2, so that driving force applied to the head portion 10 is transmitted directly to the nail heads 42.

Preferably, three nails are used for stability during installation, but a different number may be used. The nails may or may not be pre-installed in the holder. The nails may be provided separate from the holder so that an installer will have to insert the nails in the respective holes prior to installation.

Referring to FIG. 7, the post portions 30 have respective top edges 45 that engage the undersides of the respective nail heads 42, providing a shoulder as a stop to always keep the nail head 42 in direct contact with the bottom surface 44 of the head portion 10. The top edges 45 are preferably in line with the top edge 49 of the sleeve portion 28 so that a gap 51 substantially equal to the thickness of the nail heads 42 is maintained between the bottom surface 44 and top edge 49. This advantageously insures that the bottom surface 44 is directly in contact with the nail head 42.

The concrete anchor assembly 2 is attached to the wood formboard by hammering the head portion 10. The hammering forces are then transmitted to the nail heads 42 by virtue of direct contact of the nail heads 42 with head portion 10, thereby driving the nails 40 into the formboard. Providing the concrete anchor assembly 2 complete with holder, anchor body and attaching nails in one package advantageously makes for an efficient installation.

Referring to FIG. 8, the top edge 34 of the plug portion 26 includes a ramp surface 46 that engages a beveled surface 48 on the bottom edge of the rod portion 8. Contact between the surfaces 46 and 48 advantageously reduces entry of the concrete slurry between the bottom edge 22 of the anchor body 6 and the top edge 34 of the plug portion 26 during a concrete pour.

The bottom surface 50 of the plug portion 26 includes a circumferential V-shaped projection 52 disposed around the opening 53 that digs into the formboard surface when the concrete assembly 2 is installed, thereby sealing the bores 14 and 16 from the concrete slurry during concrete pour.

Referring to FIG. 9, the projection 52 may be replaced with an O-ring 54 disposed in a groove 56 on the bottom edge 50 of the plug portion 26. The O-ring 54 is configured to seal the opening 53 from the concrete slurry.

Another embodiment of a concrete anchor assembly 58 is disclosed in FIGS. 10-13. The assembly 58 includes a holder 60 and an anchor body 62. The anchor body 62 includes a rod portion 64 and a head portion 66. The rod portion 64 includes outside threads 68 and 70. The outside thread 68 is preferably larger in diameter than the outside thread 70. The anchor body 62 also includes inner threaded bores 72 and 74. The inner threaded bore 74 is advantageously larger in diameter than the threaded bore 72.

The head portion 66 may include a threaded bore 76 for connection to another anchor body, such as a standard bolt, or to a threaded rod for connection to a load outside the concrete mass in which the anchor assembly 58 is embedded. A nut 78 may be attached to the anchor body 62 via the outside thread 70 and the inside thread 71 after the concrete has cured and the formboard to which the anchor assembly 58 was attached has been removed, thereby making accessible the outside thread 70. The nut 78 includes another thread 80 having a diameter larger than the diameter of the inner thread 74. The use of the nut 78 gives the anchor body 62 the capability to accept one of three different sized threaded rods. This gives the anchor assembly 58 maximum flexibility for supporting different loads requiring different diameter threaded rods from the anchor body 62.

The head portion **66** extends outwardly and transversely from the rod portion **64** to provide the anchorage function within the concrete mass in which the anchor assembly **58** is embedded.

Referring back to FIG. **10**, the holder **60** includes a base portion **82**, a sleeve portion **84** connected to the base portion **82** and post portions **86** including vertical openings **87** for receiving and vertically positioning respective nails **88**.

Referring back to FIGS. **11** and **13**, the sleeve portion **84** includes an upper portion **90** with internal thread **92** that engage the outside thread **68** on the anchor body **62**. The sleeve portion **84** also includes a lower portion **94** with an internal diameter adapted to receive the nut **78** when attached to the anchor body **62**. The lower portion **94** may include an inside diameter larger than the inside diameter of the upper portion **90** if needed to accommodate the nut **78**.

Referring to FIG. **12**, the base portion **82** includes a bottom surface **96** with a V-shaped projection **98** around the peripheral edge of the opening **100** of the sleeve portion **84**. The projection **98** extends downwardly from the bottom surface **96** such that when the assembly **58** is attached to the formboard (without the nut **78**), the projection **98** will be depressed into the wood formboard, thereby to seal the opening **100** from the concrete slurry during concrete pour.

Referring to FIG. **11**, each of the nails **88** includes a nail head **102** that is in direct contact with an underside **104** of the head portion **66**. Top surfaces **105** provide respective stops for the nail heads **102** so that when the anchor body **62** is screwed into the holder **60**, the underside **104** will contact the nail heads **102**. A gap **107** substantially equal to the thickness of the nail heads **102** is maintained between the top surfaces **105** and the underside **104** to ensure that hammer blows to the head portion **66** are transmitted directly to the nail heads **102** to efficiently drive the nails **88** into the formboard. The nut **78** will normally not be attached to the anchor body **62** when attaching the anchor assembly **58** to the formboard. A person of ordinary skill in the art would appreciate that directly hammering on the nail heads **102**, with the anchor body **62** out of the way, may also be used in attaching the holder **60** to the formboard. The placement of the nail heads **102** on the stops **105** advantageously makes the nail heads **102** visible throughout the time the holder **60** is being attached to the formboard.

Referring to FIGS. **14-16**, another embodiment of a concrete anchor assembly **106** is disclosed. The concrete anchor assembly **106** includes an anchor body assembly **108** and a holder **110**. The anchor body assembly **108** includes a housing **112**, a split nut **114**, a washer **116**, a spring **118** and a cap **120**.

The housing **112** has an opening **122** and a bottom wall **124** for supporting the split nut **114**. The bottom wall **124** has an internal ramp surface **126** on which the split nut **114** will rise up when a threaded rod is axially forced into the split nut **114** through the opening **122**. The cover **122** is threaded into the housing **112** to bias the spring **118** against the washer **116** to thereby bias or force the split nut **114** unto the bottom of the ramp surface **126**. The housing **112** includes a circumferential flange portion **128** that extends outwardly and transversely from a vertical cylindrical wall portion **130** of the housing **112**. The flanged portion **128** provides the anchorage function of the anchor assembly **106** when embedded in concrete.

The wall portion **130** has an upper cylindrical portion **132** provided with thread **134**. A lower portion **136** of the wall portion **130** may be of a smaller diameter than the upper wall portion **132** such that a shoulder **138** is created.

The bottom peripheral edge of the opening **122** includes a bevel surface **140** that mates with a corresponding surface on the holder **110**.

The holder **110** includes a base portion **142**, a plug portion **144** attached to the base portion **142**, a sleeve portion **146** and a plurality of post portion **148** with vertical openings **149**. The plug portion **144** includes an opening **150** that lines up with the opening **122** in the housing **112**. The bottom peripheral edge of the opening **150** may include the projection **52** or the O-ring **54** to seal the interior of the plug portion **144** from the concrete slurry during concrete pour. A top edge **152** of the plug portion **144** includes a beveled surface **154** that mates with the corresponding beveled surface **140** on the housing **130** to provide sealing contact to minimize or prevent entry of the concrete slurry into the housing **130** during concrete pour. The sleeve portion **146** includes a single turn segmented thread **156** for cooperating with the thread **134** on the housing **112**. Shoulders **158** at a bottom portion of the sleeve portion **146** are provided as a stop to engage the shoulder **138** on the housing **112** when the housing **112** is screwed into the holder **110**. The vertical openings **149** locate the nails **160** vertically. The nail heads **162** extend over the top edge **161** of the post portions **148** that act as stops for the nail head **162**. The top edges **161** preferably are on the same level as the top edges **163** of the sleeve portion **146** such that the top of the nail heads will always engage the undersurface **164** of the flanged portion **128**. With this arrangement, the nail heads **162** will be in direct contact with flange portion **128** when the housing **112** is screwed into the holder **110**.

To attach the assembly **106** to a formboard, the cap **120** is struck with a hammer, whereby the impact forces are transmitted to the nail heads **162**, which are in direct contact with the underside **164** of the flanged portion **128**. The anchor assembly **106** may also be attached to the formboard by removing the anchor body assembly **108** from the holder **110**, thereby exposing the nail heads **162**, which are struck by a hammer to drive the nails **160** into the formboard. Positioning the nail heads **162** on the top edges **161** insures that the nail heads **162** will remain exposed above the sleeve portion **146** during installation.

Another embodiment of a concrete anchor assembly **166** is disclosed in FIGS. **17-21**. The assembly **166** includes an anchor body assembly **168** and a holder **170**.

The anchor body assembly **168** includes a housing **172**, a split nut **174**, a washer **178**, a spring **180**, a washer **182** and a C-shaped spring clip **184**.

The housing **172** includes a bottom wall **186** with a ramp surface **188** on which the split nut **174** rises upwardly when a threaded to be attached to the split nut **174** is pushed upwardly through an opening **190** after the concrete has cured, the formboard is removed to expose the holder **170** and the holder is removed. The spring clip **184** is disposed in a groove **192** inside the housing **172**. The spring **180** is under tension to urge the split nut **174** towards the bottom of the ramp surface **188**.

The housing **172** has cylindrical wall **187** with a circumferential flange portion **206** that extends outwardly transversely from the wall **187**.

The holder **170** includes a base portion **194** and a threaded projection **196** that attaches to the split nut **174**. A plurality of nails **200** are carried by the base portion **194** through respective vertical holes **202**. The nails **200** extend vertically downwardly from the base portion **194**. The nail head **204** are advantageously disposed underneath the bottom wall **186** and are in direct contact therewith so that hammer blows to the circumferential flange portion **206** are transmitted

directly to the nails heads **204** thereby to drive the nails **200** into the formboard, which forms part of the concrete form. After the concrete dries, the formboard is removed, exposing the bottom of the base portion **194** and the protruding nails **200**. A rib member **208** and recesses **210** advantageously allow a rotary powered tool, such as a drill with a yoke bit, to engage the rib member **208** and unscrew the holder **178** and remove it from the split nut **174**.

The housing **172** has a top opening **212** which may be closed off by a tape **214** or other standard means.

A split nut **216** with different diameter threads **218** and **219** is disclosed in FIG. **21**. The split nut **216** allows for the use of different diameter threaded rods as may be dictated by the load for a particular application. The split nut **216** is disposed within the housing **220** with the top opening **222** closed off by a cover **224**. The opening **222** is used for assembling the components within the housing **220**. A spring **226** urges the split knot **216** via washer **228** at the bottom of a ramp surface **230** on a bottom wall **232** of the housing **220**. A washer **234** may be used to facilitate the turning of the cover **224** when closing the opening **222**.

When a threaded rod is axially pushed into the opening **236** at the bottom wall **232**, the split nut will be pushed up on the ramp surface **230**, further compressing the spring **226** and enlarging the threaded openings **218** and **219**. When the upward force on the threaded rod ceases, the spring **226** will force the split nut downwardly along the ramp surface **230** to thereby close around and engage the thread of the threaded rod.

Further, the various features described in one embodiment may be applied to the other holder embodiments disclosed herein.

Referring to FIG. **22**, the nail heads **42** shown in FIG. **2** may be removed, leaving the nails **40** with only the shafts **238** showing. The nail shafts **238** may be secured to the underside of the head portion **10**, if needed, by glue, welding, or other standard means. In this embodiment, force applied to the head portion **10** is transmitted directly to the nail shafts **238**. The threads **12** on the anchor body **6** or **20** and the inside threads **32** in the sleeve **28** may be eliminated in this embodiment. The nail shafts **238** are frictionally held in the vertical openings **36** of the post portions **30** as shown in FIG. **9**. The sleeve **28** may also be frictionally attached to the rod portion **8** of the anchor body **6** or **20**.

Referring to FIG. **23**, the embodiment of FIG. **22** is further modified. An embodiment of a holder **240** is disclosed. The holder **240** is similar to the holder **4** disclosed above except that the holder **240** only includes the base portion **24** and the plug portion **26** of the holder **4**. The holder **240** includes the plug portion **26** with the central opening **53**. The top edge **34** of the plug portion **26** includes a ramp surface **46** that engages a beveled surface **48** on the bottom edge of the rod portion **8**. Contact between the surfaces **46** and **48** advantageously reduces entry of the concrete slurry between the bottom edge **22** of the anchor body **6** and the top edge **34** of the plug portion **26** during a concrete pour. As in the embodiment of the concrete anchor assembly **2**, the nail shafts **238** protrude through the base portion **24**. The nail shafts **238** are frictionally attached to the base portion **24** to hold the holder **240** to the anchor body **20**. It should be understood that embodiment of FIG. **23** may also include the threaded bore **18** shown in FIG. **4**.

Referring to FIG. **24**, the embodiment shown in FIG. **23** is further modified. The nails **40** include respective heads **42**, which may be attached to the underside of the head portion **10**, if needed, by glue, welding, or other standard means.

It should be understood by a person skilled in the art that the various features described in one embodiment may be applied to the other embodiments disclosed herein.

While this invention has been described as having preferred design, it is understood that it is capable of further modification, uses and/or adaptations following in general the principle of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains, and as may be applied to the essential features set forth, and fall within the scope of the invention or the limits of the appended claims.

I claim:

1. A concrete anchor assembly, comprising:
 - a) a housing including an opening and a side wall, the side wall including an upper end portion; b) a flange portion extending outwardly from the upper end portion of the side wall;
 - c) a ramp surface extending upwardly around the lower opening;
 - d) a split body disposed over the opening, the split body including a surface engaging the ramp surface, the split body including a threaded opening;
 - e) the housing including a gap between the split body and the side wall; and
 - f) a spring to force the split body toward a bottom of the ramp surface.
2. A concrete anchor assembly as in claim 1, wherein the housing is cylindrical.
3. A concrete anchor assembly as in claim 1, and further comprising a plug inside the opening.
4. A concrete anchor assembly as in claim 1, wherein the threaded opening has multiple diameters.
5. A concrete anchor assembly as in claim 1, wherein the split body is a split nut.
6. A concrete anchor assembly as in claim 1, wherein the housing includes an upper opening covered with a tape.
7. A concrete anchor assembly as in claim 1, wherein the housing includes an upper opening with a threaded cover.
8. A concrete anchor assembly as in claim 1, and further comprising:
 - a) a first washer disposed on the split body inside the housing; and
 - b) the spring is disposed above the first washer.
9. A concrete anchor assembly as in claim 8, and further comprising:
 - a) a second washer operably attached to an upper portion of the housing; and
 - b) the spring is disposed between the first washer and the second washer.
10. A concrete anchor assembly as in claim 9, and further comprising:
 - a) a spring clip operably attached to the side wall inside housing;
 - b) the spring clip is disposed above the second washer to hold the second washer against the spring.
11. A concrete anchor assembly as in claim 10, wherein:
 - a) the side wall includes a circumferential groove in the side wall inside the housing; and
 - b) the spring clip is disposed inside the circumferential groove.
12. A concrete anchor assembly as in claim 1, wherein the flange portion is circumferential around the housing.
13. A concrete anchor assembly as in claim 3, wherein:
 - a) the plug includes a base portion; and
 - b) the housing is disposed on the base portion.

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14. A concrete anchor assembly as in claim 13, and further comprising a nail extending through the base portion.

15. A concrete anchor as in claim 1, and further comprising a holder for the housing.

16. A concrete anchor assembly as in claim 15, wherein: 5

- a) the housing includes outside threads; and
- b) the holder includes an opening with inside threads mated to the outside threads.

17. A concrete anchor assembly, comprising:

a) a plug having a plug portion and a base portion attached 10 to the plug portion, the base portion for attachment to a form board prior to pouring of concrete;

b) a hollow anchor body operably attached to the plug 15 portion, the hollow anchor body including an opening and a side wall, the hollow anchor body including a ramp surface extending upwardly around the opening, the hollow anchor body including a flange portion extending from an upper end portion of the side wall;

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c) a split body disposed over the opening, the split body including a surface engaging the ramp surface, the split body including a threaded opening;

d) the hollow anchor body including a gap between the split body and the side wall; and

e) a spring to force the split body toward a bottom of the ramp surface.

18. A concrete anchor assembly as in claim 17, wherein:

a) the base includes a peripheral edge; and

b) openings disposed along the peripheral edge to receive screws or nails for attaching the base to the form board.

19. A concrete anchor assembly as in claim 17, wherein the split body includes multiple threaded bores of differing diameters.

20. A concrete anchor assembly as in claim 17, wherein the split body is a split nut.

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